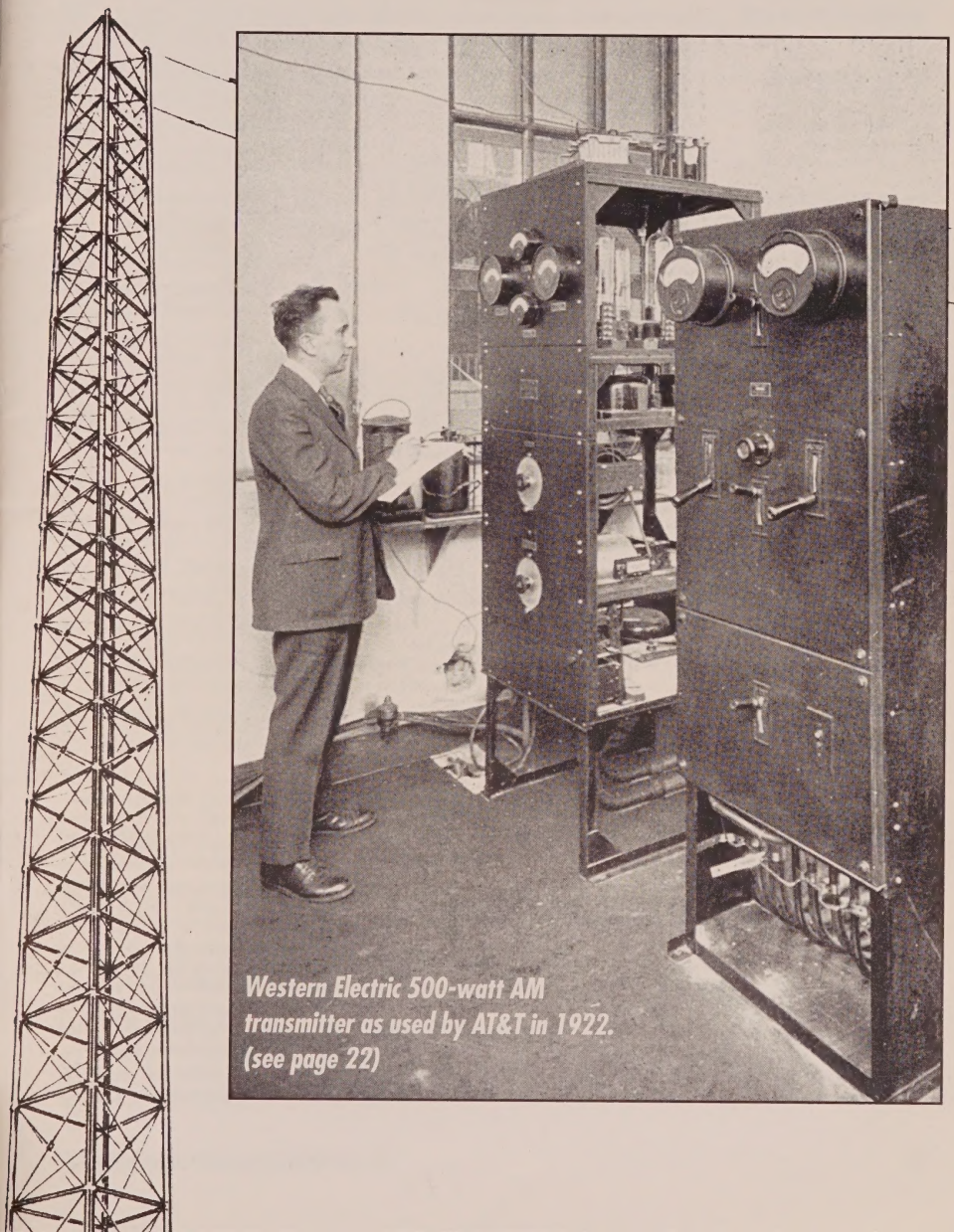
The OTB

THE OLD TIMER'S BULLETIN FEBRUARY 2004 VOL. 45 / #1

OFFICIAL JOURNAL OF THE ANTIQUE WIRELESS ASSOCIATION, INC.

Published for the collector, historian and old-time radio operator



Western Electric 500-watt AM transmitter as used by AT&T in 1922. *(see page 22)*

THE OLD TIMER'S BULLETIN

OFFICIAL JOURNAL, ANTIQUE WIRELESS ASSOCIATION, INC.™

BRUCE L. KELLEY 1914-1997, FOUNDING EDITOR

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THE PRESIDENT'S MESSAGE

I wish you all a Healthy and Happy New Year. This is a time when we reflect on the previous year. It was an interesting one for me, since it was my first year in office.

The AWA is a vibrant and healthy organization full of dedicated members. I would like to thank all of you who have helped the organization this year and encourage others to step up and help our great group.

As you may remember, in my last *President's Message* I gave the wrong dates for the 2004 Conference. The correct ones are August 17-21, 2004. Please mark your calendars. I hope this did not create too much confusion.

We are already working on the programming for the conference. Lauren Peckham, our Program Chairperson, has informed me that he has some great speakers lined up. The theme will be "Broadcasting." Items like microphones, transmitters, tape machines, control boards and other items used in the broadcast industry will be included in the contest categories along with our standard ones. Let's make this a great meet!

As always I am eager to hear from you. If you have any questions or comments feel free to contact me, but please no calls after 9:30 p.m. (Eastern time), if possible.

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FROM THE EDITOR

AWA Logo Now Trademarked

The well-known AWA logo, a Hertz loop bearing the initials "AWA," has recently become a registered trademark of Antique Wireless Association, Inc. This has come about thanks to the efforts of AWA Director and Museum Deputy Director Allan Pellnat, KX2H. Allan has asked me to post the following guidelines for the use of the trademark and Association name:

Individual members and affiliated chapters of AWA may use the logo on printed matter associated with that membership or affiliation. Such printed matter may include but not necessarily be limited to:

- *Club stationery, business cards and signage*
- *Published advertising of club sponsored activities and events*
- *Members' personal calling cards (non-business related)*
- *Club station QSL cards*
- *Member's personal QSL cards*

Usage not clearly compliant with the above cases must receive prior written approval by the Board of Directors of Antique Wireless Association Inc.

When it is used, the logo must be subscripted with the circled "r" symbol (for a sample see the inside front cover of this publication).

The Association has filed for, but has not yet received, Federal trademark registration of the phrases "Antique Wireless Association" and "Antique Radio Club of America." Such filing constitutes a public notice of our ownership and usage of these phrases as trademarks.

The first appearance of these phrases in printed matter must be subscripted with the "TM" symbol and accompanied by a footnote or parenthetical statement stating that: (Antique Wireless Association) or (Antique Radio Club of America) is a trademark of the Antique Wireless Association. Inc.

When and if we receive federal registration of either or both of these phrases the TM symbol should thereafter be replaced by the circled "r" symbol.

Spectrum Conservation

Ronald Thomas's article "The Radio Spectrum: Utilizing a Scarce Resource" touches on how the usable radio spectrum has been expanded over the years by technological innovation and strategies for sharing. As it happens, the Al Smith article "Experiences in Early Broadcasting" focuses more sharply on the channel sharing techniques used by both the early and more current broadcast industries.

But in his introduction to Part 1 of "Power Line Carrier Communication" in "Below 535," Frank Lotito, K3DZA, hints what might become a new threat to users of the radio spectrum: the possible widespread use of power lines as a medium for "broadband" digital communications. Look for more discussion of this topic in Part 2, which will appear in our next issue.

New OTB Release Schedule

We are going to be changing *The OTB's* traditional release dates. The reasons: (1) Our for-

AWA NEWS

***OTB* POLICY ON PROMOTING EVENTS:** The *OTB* is pleased to list the meets and meetings of any established antique radio organization, whether or not it is associated with the AWA. Do not send your information directly to the *OTB* Editor. Please send it to Joyce Peckham, Box E, Breesport, NY 14816. Closing date is six weeks prior to first day of month of issue.

Calendar of AWA Activities

FEBRUARY 6-8
HVRA/AWA Annual Convention

MARCH 11-12
AWA 30s Night Contest

MARCH 25-27
Carolinas Chapter, AWA Spring Meet in the Carolinas

APRIL 14-15, APRIL 17-18
Linc Cundall Memorial OT DX Contest

APRIL 30 AND MAY 1
IHRS/AWA Spring Meet

MAY 1
AWA Expanded Spring Meet

MAY 1
AWA Museum Board Meeting

MAY 1
AWA, Inc. Board Meeting

AUGUST 17-21, 2004
AWA Annual Conference

Calendar of Meets

(AWA logo identifies AWA-sponsored events)

25TH HVRA/AWA ANNUAL CONVENTION

February 6-8

Houston Vintage Radio Association/AWA convention will be held on Friday thru Sunday, February 6-8, 2004 (weekend following the Super Bowl). The 25th Anniversary Celebration will be held at the Greenspoint Marriott in North Houston (Interstate 45 at Beltway 8). The events include four auctions, an old equipment contest featuring Zenith radios and related items, radio raffle, awards banquet with many door prizes, and technical presentations. Information on the event schedule, registration and technical talks will be posted on the HVRA website (www.HVRA.org). For a convention brochure and registration form contact Bill Werzner at 713-721-2242 or e-mail: mingqi53@sbcglobal.net.

SCARS AUCTION

February 21

Sponsored by Southern California Antique Radio Society. Begins 9 a.m. at St. Andrews Lutheran Church, 15520 Sherman Way, Van Nuys, CA. Info: Mary Curry, 619-461-9327; currycat@cts.com

AWA 30S NIGHT CONTEST

March 11-12

See Amateur Radio column, this issue, for details.

SPRING MEET IN THE CAROLINAS

March 25-March 27

Presented by the Carolinas Chapter of AWA at the Sheraton Charlotte Airport Hotel, I85 at Exit 33, Charlotte, NC. Contact information in "With the Chapters," elsewhere in this section. Full information can be found on the CC-AWA website at http://www.cc-awa.org. For hotel reservations at our special group rate, phone (704) 392-1200 or visit the website. Printable pre-registration forms and a printable brochure will also be found on the site.

LINC CUNDALL MEMORIAL OT DX CONTEST

April 14-15, April 17-18

See Amateur Radio column, this issue, for details.

SECOND EARLY TELEVISION CONVENTION

April 24-25

The Early Television Foundation (ETF) proudly

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mer August issue (which contains all of the Conference information) is no longer timely now that our Conference is being held so much earlier, and (2) Our former November issue barely provides enough legal notice of the dates of our November Board and Membership Meetings.

We've been getting around this problem by doing our best to release each of these two issues a little earlier than usual, but the uneven production schedule has been difficult for the production staff and columnists. So in the interests of providing more timely information to our members and more consistent production deadlines, we've made the decision to back up our release schedule by one month.

The change goes into effect this summer, with the August, November, February and May issues becoming—from then on—the July, October, January and April issues. The upcoming May issue remains as is, but we will do our best to release it earlier than usual so that the time between its release and that of the new July issue won't be too short.

announces its second Convention to be held at the ETF Museum, 5396 Franklin St, Hilliard, OH. Scheduled will be a wide variety of discussions and demonstrations of television equipment and systems from the mechanical through the early electronic eras. A nominal registration fee includes lunch and drinks, and there will be an optional "Early TV Banquet." For more information, contact Steve McVoy, ETF President, (614) 771-0510; etf@columbus.rr.com or visit the Foundation website at www.earlytelevision.org.

IHRS/AWA SPRING MEET

April 30 and May 1

Indiana Historical Radio Society and AWA present their 33rd Annual Antique Radio Festival. The meet will be held again at the Johanning Civic Center located at 1500 North Reed Road (US 31) on the north side of Kokomo, IN. Many restaurants and motels are situated close by. A snack bar will be provided by the Civic Center. Tentative setup times are 2 p.m. Friday with swap and sell from about 4 p.m. to 8 p.m., then Saturday from 7 a.m. until about 3 p.m. There is plenty of space to set up inside the very large new facility. No outside setup will be permitted by the Center. An old equipment contest will be held for members. We encourage everyone to participate in, and witness, the operational radio displays. An auction of over 100 radios and radio related items, mostly from the collection of an IHRS member, will begin right after the awards luncheon on Saturday. Advance registration is encouraged. Contact Fred Prohl at (812) 988-1761 or indianahistoricalradio@att.net. For Kokomo info, contact Herman Gross at (765) 459-8308 or w91tt@mindspring.com. Visit the IHRS website at www.indianahistoricalradio.org.

AWA EXPANDED SPRING MEET

May 1

Now an indoor event to be held at the Bloomfield Elementary School, located just around the corner from the A.W.A. Electronic Communication Museum Annex at 6910 Rt. 5 & 20 (intersection with Rt. 444). All activities will be indoors, including the flea market, the museum excess inventory sale and auction, the commercial vendors, and new and expanded programs and demonstrations. Already booked: a big Tesla coil demonstration. Annex and Museum tours will be scheduled as usual. Opening is at 8:00 a.m. for AWA members; 9 a.m. for the general public. Sellers can set up earlier (tables will be available @ $3.00), but there will be no early selling. Preregistration not necessary. For more info, including commercial vendor opportunities, contact Meet Chairman Bob Roberts, WA2QAU, 1982 Wheatland Center Rd., P.O. Box 58, Scottsville, NY 14546, or Museum Curator Ed Gable, K2MP, (585) 392-3088; k2mp@eznet.net.

AWA MUSEUM BOARD MEETING

May 1

Same location as AWA Expanded Spring Meet. Time to be announced.

AWA, INC. BOARD MEETING

Same location as AWA Expanded Spring Meet. Time to be announced.

Recurring Meetings & Events

•Antique Radio Collectors of Ohio—meets first Tuesday of each month at 2929 Hazelwood Ave., Dayton, OH (4 blocks east of Shroyer Rd. off Dorothy Lane) at 7 p.m. Also annual swap meet and show. Membership: $10.00 per year. For more info, contact Karl Koogle: mail to above address; phone (937) 294-8960; e-mail KARLKRAD@GEMAIR.COM

•California Historical Radio Society—For info on current meetings, call the CHRS hotline: (415) 821-9800.

•CARS, the Cincinnati Antique Radio Society—Meets on the third Wednesday of each month at the United Methodist Church, 7388 E. Kemper Rd. For more information contact Tina Hauke at (513) 247-9406.

•Carolinas Chapter of the AWA—Hosts four "mini-swap-meets" each year (in January, May, July and October) plus an annual conference, "Spring Meet in the Carolinas," on the 4th weekend in March. Executive committee meets approximately quarterly. For more info, visit the website at CC-AWA.ORG or contact Ron Lawrence, KC4YOY, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail kc4yoy@trellis.net

•Central Ohio Antique Radio Assn.—Meets at 7:30 p.m., third Wednesday of each month at Devry Institute of Technology, 1350 Alum Creek Rd., Columbus. (1-70 Exit 103B). Contact: Barry Gould (614) 777-8534.

•Delaware Valley Historic Radio Club—Meeting and auction begins 7:30 p.m. on the second Tuesday of each month. Location: Telford Community Center on Hamlin Ave. in Telford, PA. Annual dues: $15.00, which includes a subscription to the club's monthly newsletter *The Oscillator*. For more info contact Delaware Valley Historic Radio Club, P.O. Box 5053, New Britain, PA 18901. Phone (215) 345-4248.

•The Downer's Grove (IL) Park District Museum sponsors a monthly "Collector's Hour." Par-

With the Chapters

CC-AWA CHAPTER NEWS

Hello to everyone in radio collecting land. As I sit at the PC writing this, Christmas is just a few days away. This past Saturday evening a group of CC-AWA members got together for our annual Christmas dinner. As usual, a good time was had by all. Besides all the great food and socializing, we also got the final results from our just-completed election.

It seems that through some fluke of the electoral process, I was re-elected as President on the chapter. Richard Owens was chosen as our new VP, Robert Lozier remains in office as club Treasurer, and Richard Wayne is our new club Secretary. After dinner we all convened at Robert Lozier's home to peruse his fine collection and check out his month-long dusting project. One of the wives that hadn't been there before was heard to exclaim, "My god, where did he get all this stuff?" I'll bet she's just thanking her lucky stars she doesn't have to dust it.

The 28th Annual "Spring Meet in the Carolinas," the CC-AWA's Annual Conference will take place for the 10th year at the Sheraton Charlotte Airport Hotel on Thursday-Friday-Saturday March 25-26-27, 2004. Everyone that has attended this event anytime in the last 6 or 8 years will get a conference brochure.

Those of you that are "on line" can find full details, including printable pre-registration forms and a printable brochure, by visiting the club's web page at, http://www.cc-awa.org. There you will also find a complete schedule of events, a listing of the "Old Equipment Contest" categories, and instructions on how to pay your conference registration on-line via PayPal.

If you are not internet-equipped and would like to receive a conference brochure, you can request one by writing to CC-AWA 2004, P.O. Box 3015, Matthews, NC 28106. I hope to see everyone there. Happy collecting.

Ron Lawrence
704-289-1166 (home),
kc4yoy@trellis.net (email)

ticipants have the opportunity to display collections at the facility for several weeks before making their individual presentations. The event is open to the public with no admission charge. The museum has also begun to sponsor a yearly "Collector's Fair." For more info, contact Mark Harmon, the Downer's Grove Park District Museum, 831 Maple Ave., Downer's Grove, IL, 630-963-1309, fax 630-963-0496, mharmon@xnet.com.

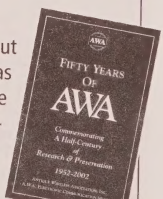
• Houston Vintage Radio Association (HVRA)—Meets monthly on the second Tuesday (April thru Oct) at Bayland Park, 6:30-9 p.m. in SW Houston. March and November meetings are held on Saturdays at the American Legion Hall off Alba Street in North Houston at 9 a.m. Each meeting includes an auction and program. Two one day auctions are held each spring and fall. An annual convention is held in February. A newsletter, *The Grid Leak*, is published monthly. Membership is $20/yr. Website: www.HVRA.org. Write: HVRA, P.O. Box 31276, 77231-1276 or call Bill Werzner 713-721-2242 (e-mail: mingqi53@sbcglobal.net).

•Hudson Valley Antique Radio & Phono Society—Meets third Thursday of month, 7 p.m. Meeting, swap meet, and membership info: Peter DeAngelo, President, HARPS, 25 Co. Rt. 51, Campbell Hall, NY 10916. (914) 496-5130.

•Indiana Historical Radio Society—Meets quarterly in Feb., May, Aug or Sept and Oct. Flea Market and Old Equipment Contest at all events. Auctions at all but Feb Meet. The *IHRS Bulletin* has been published quarterly for the past 32 years. For Meet details and information about the club and our Indiana Historic Radio Museum in Ligonier, IN see our website at www.indianahistoricalradio.org or contact Herman Gross, W9ITT, 1705 Gordon Dr., Kokomo, IN 46902-5977, (765) 459-8308,

50th Anniversary Commemorative Booklet

Our 50th anniversary commemorative booklet *Fifty Years of AWA* was recently mailed out to all members. The publication has received high marks from almost everyone who has seen it. We still have a stock of this profusely-illustrated 60-page AWA history available for those who would like extra copies or those who were not members at the time of distribution and didn't receive one. Cost is $7.00 per copy postpaid, no limit. But once they're gone they're gone—so act now if you are interested! Send your check to Joyce Peckham, Box E, Breesport, NY 14816.



w9itt@mindspring.com

•London Vintage Radio Club—This Ontario, Canada club meets in London on the first Saturday of January, March, May, June and November. Annual flea market held in Guelph, Ontario in September in conjunction with the Toronto club. Contact: Lloyd Swackhammer, VE3I1A, RR#2, Alma, Ontario, Canada N0B1A0. (519) 638-2827. E-mail contact is Nathan Luo at lvrceditor@yahoo.com.

•Mid-Atlantic Radio Club—Meets monthly, usually the third Sunday of the month at the New Hope Seventh Day Adventist Church, Burtonsville, MD. Contacts: President, Geoff Shearer, 14408 Brookmere Dr., Centreville, VA 20120, e-mai: gshea90278@aol.com; Membership Chair, Paul Farmer, (540) 987-8759, e-mail:oldradiotime@hotmail.com. Website www.maarc.org

•New Jersey Antique Radio Club—Meets second Friday each month, 7:30 p.m. Holds three annual swap meets. Contact (send SASE) Phil Vourtsis, 13 Cornell Pl., Manalapan, NJ 07726, (732) 446-2427.

•Northland Antique Radio Club—Hosts four events with swap meets each year (in February, May, September and November) including an annual conference, "Radio Daze," for two days in mid-May. Annual dues are $12.00, which includes a subscription to the club's quarterly newsletter. For more info, visit our website at www.geocities.com/northland.geo/; contact Ed Ripley at (651) 457-0085; or write NARC, P.O. Box 18362, Minneapolis, MN 55418.

AWA NETS

(EASTERN TIME)

PHONE

SUNDAY:
7244 kHz, SSB, noon (NCS:WA4IAM); 3837 kHz, AM 4:30 p.m. (NCSs: KA2J & W2AN)

TUESDAY:
14274 kHz, SSB, 2:30 p.m. (NCSs: KC3YE and W0FXY); 3837 kHz SSB, 8 p.m. (NCS: WB2SYQ)

MONDAY-WEDNESDAY-FRIDAY:
The AWA Bruce Kelley HF Net
3867 kHz, SSB, 9:30 a.m. (NCS: W2OBJ)

CW

DAILY, 4 p.m., 3588 or 7050 kHz. Protocol, informal. Check both frequencies for activity and join in, or call AWA de (your call) and see what you stir up.
First WEDNESDAY of each month, 8 p.m., 7050 kHz

2-M REPEATER (Rochester Area)

MONDAY, 7:30 p.m. (NCS: K2GBR)
Receive 145.290 MHz / Transmit 144.690 MHz

AWA Life Memberships Are Now Available

Cost: $400 (U.S.), $500 (elsewhere) . Send your check to AWA Secretary Joyce Peckham, Box E, Breesport, NY 14816. Phone (607) 739-5443. E-mail:awapeckham@ aol.com.

•Northwest Vintage Radio Society—Meets second Saturday of each month (except July and August), at or about 10 a.m., at Abemathy Grange Hall, 15745 S. Harley Ave., Oregon City, OR. Members display radios, exchange information. Guests welcome at all meetings and functions, except board meetings. For info, write the Society at P.O. Box 82379, Portland, Oregon 97282-0379.

•Oklahoma Vintage Radio Collectors—Oklahoma City Chapter meets second Saturday each month at Hometown Buffet, 3900 N.W. 63rd St., Oklahoma City, OK. Visitors welcome. Dinner/socializing, 6 p.m.; meeting at 7 p.m. Membership, $12/yr., includes monthly *Broadcast News*. Info: SASE to OKVRC, P.O. Box 50625, Midwest City, OK 73140-5625; or contact Fred Karner at (405) 769-4656 or fkarner@ cox.net; or visit our website at http://members. cox.net/okvrc/

•Ottawa Vintage Radio Club—Meets monthly (except June and July) in the Conference Room, *Ottawa Citizen*, 1101 Baxter Rd., Ottawa, Ontario, Canada. Contact: Lea Barker at (613) 829-1804 or check www.ovrc.org. Membership: $10 Canadian/yr.

•Pittsburgh Antique Radio Society welcomes visitors to our Saturday flea market/contests in March, June, September, and December. An auction is included in September, and our annual luncheon/program is held the first Saturday in December. Our newsletter, *The Pittsburgh Oscillator*, is published quarterly. Website: www.nb.net/~schaefer/pars.html. For directions, specific dates, information call President Bonnie Novak at 412-481-1563 or write to Karl Laurin, 8111 Sally, White Oak, PA 15131.

•Society for Preservation of Antique Radio Knowledge—Meets at 7:30 p.m. the second and fourth Tuesdays of each month in the party room at Cassano's Pizza Parlor, 1700 East Stroop Rd., Kettering, OH. Membership, $18/year. Write SPARK Inc, P.O. Box 292111, Kettering, OH 45429; e-mail sparkinc@juno.com or call John Pansing at (937) 299-9570.

•Texas Antique Radio Club—Meets alternate months in Kyle and Shertz, TX. Contact: Ron Manning, President TARC, 133 East Huisache Ave., San Antonio, TX 78212. Phone (210) 734-6831; e-mail ronmeg@gateway.net; website www.gvtc.com/~edengel/TARC.htm.

Service Sources Available

The AWA Source Sheet is a listing of parts suppliers and services for the radio collector. Cost: only a business-size self-addressed stamped envelope to AWA, Box E, Breesport, NY 14816.

AWA VHS Video Programs

The Antique Wireless Association has available several historical documentaries to loan to affiliated organizations for club meetings and programs. There is no charge for this service other than return mailing cost. For info on loan conditions, to make reservations, or just inquire, contact Ed Gable, Curator, AWA Electronic Communication Museum, 187 Lighthouse Rd., Hilton, NY 14468. The following are available:

V-2 — "Electrons on Parade." 18 min. 1938 movie made at RCA's Harrison Plant showing production lines with closeups showing receiving tubes, including a short sequence on transmitting tubes. (Very rare movie.)

V-4 — "The British Receiver." Documentary of the AWA/BVPS meet with visit to Marconi's Chelmsford plant, the British Science Museum, and ending with series of collectible British receivers. (VHS program transferred from slides.)

V-5 — "The Early Years." Historical documentary narrated by Clarence Tuska telling of the early years of amateur radio, founding of the ARRL and WWI military radio training school. (VHS program transferred from slides.)

V-6 — "The Key." History of the telegraph/radio key covering early hand keys, semi-automatics and commercial types. Script by Lou Moreau, W3WRE. (VHS program transferred from slides.)

V-9 — "The Transatlantic Tests and 1BCG." Rare documentary/photographs showing early amateur operation leading to famous 1921 transatlantic tests.

V-12 — "Those Wonderful Magazine Covers." The story of radio through magazine covers. Colorful with period music.

V-15 — "The WHAM Story." Details development of a pioneer radio station in Rochester, NY. Program developed with assistance and recollections of Art Kelly, the station's former general manager.

V-16 — "The Charles Herrold Story." Video prepared by Mike Adams who donated this copy to the AWA. It documents the work of broadcasting's Forgotten Father who started broadcasting in 1912.

ANTIQUE WIRELESS ASSOCIATION, INC. PROFIT AND LOSS
November, 2002 through October, 2003

Ordinary Income/Expense	
Income	
6073C AWA REVIEW 14	89.95
6100C MEMBERSHIP BY CREDIT CARD	1,149.99
6805C CONFERENCE BOOK FAIR	40.00
6007C MISCELLANEOUS INCOME - CLUB	68.00
6010C CLUB MEMBERSHIP DUES	60,506.95
6011C MEMBERSHIP CONTRIBUTIONS	550.00
6036C CONTRIBUTIONS - CLUB	1,550.00
6045C SALES	
6055C GENERAL BOOK SALES	70.00
6045C SALES - Other	214.20
Total 6045C SALES	284.20
6800 CONFERENCES	
6800C CONFERENCE - GENERAL	36,534.01
6803C CONF. PREREGISTRATIONS	17,742.00
6804C CONFERENCE REGISTRATIONS	62.00
6800 CONFERENCES - Other	360.00
Total 6800 CONFERENCES	54,698.01
Total Income	118,937.10
Cost of Goods Sold	
8105 COGS AWA REVIEW 16	9,398.49
8117C COGS - AWA REVIEW 15	497.00
Total COGS	9,895.49
Gross Profit	109,041.61
Expense	
8193 BOARD MEMBER ONLINE SERVICES	101.70
8000C OTB EXPENSES	
8040C OTB PRINTING AND ASSEMBLING	30,946.61
8045C OTB - ENVELOPES	0.00
8047C OTB - STUFFING & MAILING	550.00
8050C OTB - STAMPS	16,214.70
8000C OTB EXPENSES - Other	124.11
Total 8000C OTB EXPENSES	47,835.42
8001C BANK SVC CHARGE	414.74
8004C HF CONTESTS	71.25
8011C CREDIT CARD CHARGES	531.08
8014C COMPUTER SUPPLIES	4.85
8030C INSURANCE - OFF. & DIR. LIAB.	2,487.00
8055C POSTAGE MACHINE & MAILING	570.80
8065C OFFICE SUPPLIES - CLUB	1,457.83
8067C ACCOUNTING	1,535.00
8068C LEGAL	100.00
8060C GENERAL POSTAGE- CLUB	366.08
8091C BOARD MEETING COSTS	906.38
8092C BOARD MEETING TRAVEL	335.25
8115C ADVER. AND PHOTOGRAPHY	4,671.17
8160C TELEPHONE - CLUB	1,051.30
8191C MISC. EXP. - CLUB	689.68
8192C AOL SERVICE - SECRETARY	678.52
8300 CONFERENCE EXPENSES	
8300C CONFERENCE	100.00
8301C CONFERENCE - MISC. COSTS	90.79
8302C CONFERENCE - AUCTION PAYOUTS	22,201.70
8303C CONFERENCE SUPPLIES	386.00
8304C CONF TRANS - BUS, SHUTTLE	2,550.00
8305C CONFERENCE AWARD MATERIALS	807.80
8306C CONFERENCE FORMS - PRINTING	1,231.40
8307C CONFERENCE BADGES	384.47
8308C CONFERENCE SECURITY	2,055.00
8309C CONFERENCE REG. REFUNDS	69.00
8311C CONFERENCE HOTEL BILL	16,664.26
Total 8300 CONFERENCE EXPENSES	46,540.42
Total Expense	110,348.47
Net Ordinary Income	-1,306.86
Other Income/Expense	
Other Income	
9500 Unrealized Gain (loss) on Inves	8,361.36
Total Other Income	8,361.36
Net Other Income	8,361.36
Net Income	7,054.50

ANTIQUE WIRELESS ASSOCIATION, INC.
BALANCE SHEET
As of October 31, 2003

ASSETS	
Current Assets	
Checking/Savings	
1078 HSBC CHECKING- CLUB	5,806.44
Total Checking/Savings	5,806.44
Other Current Assets	
Certificates of Deposit	
1102C CHASE 48 MONTH CD	26,570.63
1102 CHASE - 24 MO. CERT.	6,772.59
1103 CHASE - 36 MO. CERTIFICATE-CLUB	21,409.33
1105 CHASE - 24 MO. CERT. - CLUB	18,361.44
Total Certificates of Deposit	73,113.99
Total Other Current Assets	73,113.99
Total Current Assets	78,920.43
Other Assets	
1200 MARKETABLE SECURITIES	
1233 MERRILL LYNCH MONEY MARKET ACCT	52,578.88
1232 MERRILL LYNCH MONEY MARKET	87,681.32
1255 FIDELITY ASSET MGMT MF	50,543.25
1231 ALGER SMALL CAP FUND	7,129.76
1230 ALGER MID CAP FUND	18,286.24
Total 1200 MARKETABLE SECURITIES	216,219.45
Total Other Assets	216,219.45
TOTAL ASSETS	295,139.88
LIABILITIES & EQUITY	
Equity	
3800 RESERVES FOR AWARDS	5,990.10
3900 NET ASSETS	282,095.28
Net Income	7,054.50
Total Equity	295,139.88
TOTAL LIABILITIES & EQUITY	295,139.88

SUMMARY OF MINUTES
Antique Wireless Association, Inc.
Membership and Board of Directors Meetings

Membership Meeting, November 9, 2003

The meeting was called to order by President Geoffrey Bourne on November 9, 2003 at 11:00 a.m. First item on the agenda was the Secretary's report of the AWA meeting of November 10, 2002 given by Joyce Peckham. The Report was accepted as read.

Second item was the President's report on the membership forum held at the 2003 annual conference. Geoff Bourne reported that there were about 50 members in attendance at the forum, which lasted about 35 minutes. Items of discussion were the status of the by-laws and status of the museum inventory.

Joyce then gave a membership report: US members 3028, Canadian 130, and foreign 106. Ron Frisbie gave the nominating committee report and the results of the election of board members: Item 1 to set the number of directors of the AWA to 18. 609 For, 5 Against, 10 Abstain. Item 2 To elect the following nominees to be directors of the AWA till 2006: Lawrence Babcock, Geoffrey Bourne, Gary Carter, Marc Ellis, Ronald Frisbie, Richard Neidich. 614 For, 3 Against, 7 Abstain.

The meeting was adjourned at 11:11 AM EST.

Board of Directors Meeting, November 9, 2003

The meeting was called to Order by President Geoffrey Bourne at 11:12 a.m. EST. First item on the agenda was the election of officers. The following were nominated for Nov 2003 to Nov 2004; President - Geoffrey Bourne; 1st Vice President - Brian Belanger; 2nd Vice President - Ronald Frisbie; Secretary - Joyce Peckham; Treasurer - Chris Fandt. All were elected.

Second item on the agenda was the President's report. Geoff Bourne brought up concerns about moving the location of the annual conference and the board discussed the subject. The RIT Inn and Conference Center will be the site for the 2004 conference. President Bourne gave a special thanks to Randy Haus for his time as AWA treasurer.

Third item was the Secretary's report of the May 3, 2003 board meeting. Report was accepted and motion carried.

Fourth item was the Treasurer's report. Randy Haus reported that the AWA is solvent but decline in membership is a concern.

Old business items: (1) 2003 annual conference and programming. Hugh Davey reported that the total for the conference was 730 with 251 spots at the flea market. Lauren Peckham reported that the program attendance was about the same as the previous year. The auction minimum was raised from 3 to 5 items. Thanks were given to Geoff Bourne for the Old Equipment Contest. Bruce Roloson recognized and thanked all who helped and participated in the meet. (2) Chris Fandt gave a report on AWA regional meets. There were 11 meets this year; the first in January and the last in November.

Fifth item: *The OTB*. Marc Ellis reported that things are going smoothly no major problems.

Sixth item: the *AWA Review*. Bill Fizette reported the Tom Perera has resigned as editor of the *Review*. Brian Belanger will be the new editor beginning with the upcoming volume (17). Bill will continue to work with the printer.

Seventh item: AWA internet Site. Marc Ellis read Chuck Schwark's report. Daily hits on website average 66. The AWA message board and museum pages are the most popular spots with *The OTB* coming next.

Eighth Item: Museum Activities. Ed Gable went over a handout covering current activities. He also reported that the application for a permanent charter was complete and the decision concerning a new building was still pending.

Ninth item: Investment committee. Tom Peterson went over a handout given to the board. Information supplied by Merrill Lynch.

Most of the other items were routine housekeeping concerns.

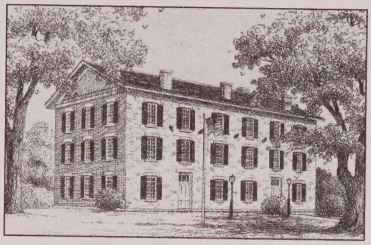
New Business: 2004 Conference. Hugh Davey pointed out that the dates for the Conference were incorrect in the last president's letter. The correct dates are August 17- 21, 2004. Lauren Peckham went over programs for 2004. The Conference is shaping up quite well.

Geoff Bourne, with Marc Ellis, announced that the release schedule of *The OTB* will be shifted, with each issue to be dated and released one month earlier. This is being done primarily because of the earlier date of the conference and to ensure adequate notice for the November board meetings. The new schedule goes into effect with the August issue, which will be released as the July issue.

The meeting was adjourned at 3:45 p.m. EST.

MUSEUM NEWS

Visit us on the Internet at http://www.antiquewireless.org



OFFICERS

Director
Thomas Peterson, Jr.

Deputy Director
Allan Pellnat, KX2H

Secretary
Robert Perry W2T1X

Treasurer
Stanley J. Avery, WM3D

MUSEUM TRUSTEES

Stanley J. Avery, WM3D
Dr. Thomas Ely, W2ODW
Ronald Frisbie*
Edward Gable, K2MP*
Prof. William Hopkins, AA2YV
Lauren Peckham*
Allan Pellnat, KX2H*
Robert Perry, W2TIX
Thomas Peterson, Jr.*
Ronald Roach, W2FUI
Ronald Walker, WA2TT
Morgan Wesson

**also on AWA Inc. Board of Directors*

MUSEUM CONTACT

For all inquiries about the Museum and its operation, contact Edward M. Gable, Curator, 187 Lighthouse Rd., Hilton, NY 14468. Phone: (585) 392-3088, e-mail: k2mp@eznet.net. *The A.W.A. Electronic Communication Museum is an IRS 501(c)3 charitable organization.*

Hello from your Museum crew. I hope your holidays were good and that everyone is all rested and ready for another year of exciting vintage communication research, restoration and collecting. The Museum volunteers took a couple of weeks off during the holidays but returned on January 6th ready to go with a ton of challenges for the future.

The biggest news and plan is to reverse an almost 20 year tradition of the AWA Spring Meet. After several years with not enough room for growth and the many occasions on which we were rained out, the decision has been made to move the Meet just around the corner from the Annex to the Bloomfield Elementary School. All activities will be indoors. These will include the flea market, the museum excess inventory sale and auction, the commercial vendors, and new and expanded programs and demonstrations.

You will not want to miss one program that is already booked: a big Tesla coil demonstration. Scheduled as always will be the usual Annex and Museum tours. The school will provide tables for those wanting to participate in the indoor flea market for a modest three dollar charge. The Spring Meet will take place on May 1st, opening at 8:00 a.m. for AWA members. Sellers can set up earlier, but there will be no early selling. The public is invited starting at 9:00 a.m. There will be plenty of room for smaller meetings if groups such as the AMers want to get together. Spread the word about this new, exciting and expanded AWA Spring Meet format!

The Meet Chairman is Bob Roberts, WA2QAU. Contact him or me about commercial vendor opportunities. Flea market folks do not need to pre-register. Mark your calendars now and plan on attending this significant vintage radio event.

Moving on to other news, many of you fondly remember AWA's old friend Paul Feldman. Allan Pellnat and I had a chance to visit him at his lovely home on a bittersweet occasion. Paul wanted to donate a large collection of his artifacts to the Museum in anticipation of his moving to a better climate where he will be closer to his family.

Paul was an active Museum volunteer, never missed a conference, and would always find time to lunch with his old friend Bart Lee. He and Bart enjoyed a common love of SWLing.

We are pleased to have Paul's McMurdo-Silver Masterpiece in excellent condition with gleaming chrome. He also donated a SX-100 and other pieces too numerous to detail here. Thank you, Paul, for everything and best to you in your move. We'll miss you, your twinkling eye, your wit, and your ability to join in conversation on any topic of a scientific nature.

Our new workbenches have been getting quite a work out. It turns out we have in the group a fine bunch of technical folks who have been doing a grand job of repairing sets to operational condition. This is an emphasis that has been lacking in the past and I'm happy that John Atwood and Duncan Brown, K2OEQ, are up to the task.

I also want to recognize the restoration skills of Jack Roubie, K2JDD. Last year we received a very nice IP-501 variant that was missing the door and all of the small hinge pieces. Jack, who

is the Museum facilities manager, made a door, made a screen to match the original, turned a knob on his lathe and then hand made all of the hinge pieces. After plating them, you can hardly tell the restored from the original. Such museum staff skills go a long way in promoting this New York State chartered museum as a safe and secure resting place for donated artifacts.

Your Museum has been taking to the road as late as well. I have modified several of the AWA slide and VHS shows to provide more entertainment and educational content while still performing their original function of promoting the AWA and the Museum activities..We are also converting the soon-to-be-outdated VHS formatted programs to CDs. Some are already completed and others are awaiting their turn. A newly-acquired Dell PC and software is dedicated to this and other "media" work. The PC was purchased with monies from the proceeds of the last Spring Meet. This is the second new Dell PC this year, replacing very outdated 100 Mhz machines, and our network administrator really likes the way they network so seamlessly. Please look at the Museum Store offerings elsewhere in this issue. There are reduced prices on some older items, and new offerings such as the A-K story CD, the Hallicrafters Story CD and the ever-popular *AWA Reviews*. The latest *Review* is #16, dedicated to Crosley. It is available for immediate shipment. Now, I mean it, mark down May 1st! S'long from your museum.

Ed Gable

ED GABLE K2MP/W2AN
Museum Curator

RECENT MUSEUM DONORS

- Tom and Pat Saffen.....Philco 16 console
- Anastasia Robinson.....Viking Ranger II, Viking Courier Amp
- Paul Feldman .....McMurdo Silver Masterpiece, SX-100, much more
- Ed Gable, K2MP .....Zenith 19F27
- Harold Finley .....Hallicrafters S-120
- Bob Roberts, WA2QAU .....Zenith BT044, early transistor handheld TV
- James Hall.....50 years of FCC licensing
- Thomas Peterson, Jr.....Eddystone 680X HF Communication RX
- Doug Smith.....78 rpm records
- William Schaal.....WE 684 Dispatcher's Telephone
- Beverly Barnett .....A-K 55 in console cabinet, good - working
- Jack Wenrich, K2RY.....Collection of 24 early headphones
- Thomas Rosicka.....Drake TR-33, Clegg 66'er
- Fred Steenoff, K1NXG ...National NC-125, as new
- Peter Greene .....RME 45, RME VHF-152A
- Gary Morse.....About 200 Sams *Photofacts*, low numbers
- Duncan Brown K2OEQ ...GE "PortaMobile" VHF FM Xcvr
- Alexander Dewa.....HQ-110A/VHF, Hallicrafters HT-40, Ameco TX-62, more
- Mrs. Gauger .....HH Scott Stereomaster, Roberts 720, Airchief 9318, more

Cash Donations:

Tax deductible cash donations are happily accepted—this quarter received from:

Rochester Institute of Technology
Mrs. Marshall
Mr. Dale Svetanoff
Mr. Mike Tuggle
Mr. Harold Blesy
Mr. Marc Ellis

SUMMARY OF MINUTES

A.W.A. Electronic Communication Museum
Membership and Board of Trustees Meetings

Membership Meeting, November 9, 2003

The meeting of the Members of the A.W.A. Electronic Communication Museum was called to order by Director Thomas Peterson, Jr. The venue was the RIT Inn and Conference Center, Rochester, NY. No members in attendance. All current Officers and Trustees were in attendance except Trustee Ron Walker due to illness. Secretary Ed Gable reported that the minutes of the last Membership meeting, November 10, 2002, were mailed to each officer and trustee and provided a brief narration of the contents. There being no additions or corrections the minutes were approved.

Ronald Frisbie, acting as Chairman of the Proxy Committee, reported that 612 valid proxies had been received as of 9 November 2003. Director Peterson asked Ronald Frisbie to report on Proxy item #1, the motion to set the number of Museum Trustees to 12. Ron Frisbie reported 612 votes FOR, 3 AGAINST and 9 ABSTAIN. Director Peterson asked Ronald Frisbie to report on Proxy Item #2, the election of names identified on the proxy and specified expiration terms. Mr. Frisbie reported 610 votes FOR, 3 AGAINST and 11 ABSTAIN.

Based on the number of approving proxies, Director Peterson declared both items PASSED. (See list of Museum Trustees on the Museum page —ed) Director Peterson provided his annual report including that the Museum Forum (meeting of three other museum Directors/Trustees) at the AWA convention was deemed very positive with a good chance to meet fellow museum leaders and to discuss matters of similar interests.

Director Peterson further referred members to detailed reports to be given in the trustees meeting to follow and financial and activity reports published in past and future issues of *The OTB*. He asked for any other business, and there being none, the meeting was adjourned.

EDWARD M. GABLE
Secretary

Board of Trustees Meeting, November 9, 2003

The meeting of the A.W.A. Electronic Communication Museum Board of Trustees was called to order at 3:10 p.m. by Director Thomas Peterson, Jr. The venue was the RIT Inn and Conference Center, Rochester, NY. All officers and Trustees in attendance except Ron Walker due to illness. Director Peterson declared a quorum present.

Secretary Edward Gable reported that minutes for the previous meeting were mailed to each Trustee. He then provided a brief overview of the minutes from the November 10, 2002, meeting. There being no corrections the meeting minutes were approved.

Ronald Frisbie, as Chairman of the Nominating Committee, provided the following slate for the term covering 2003/2004: Director, Thomas Peterson, Jr., Deputy Director, Allan Pellnat, Treasurer, Stan Avery, Secretary, Robert Perry. L. Peckham moved to approve, seconded by R. Roach. Approved.

Treasurer Stan Avery issued copies of accounting reports generated by our accounting firm Heveron and Heveron. The reports consisted of the Balance Sheet and Profit and Loss Statement of activities through the period November 1, 2002 to October 31, 2003. The issue of depreciation on buildings continues to be bothersome to some Trustees. That question was asked of the accounting firm by Treasurer Avery and their response was that this is the standard accounting method used by Not-for-Profits. There were also comments about the timing of the report which allowed little chance to review prior to the meeting. There being no further discussion the Treasurer's report was approved.

The subject of AWA, Inc. contributions was next, concerning the donation by the Club, to the Museum, copies of *AWA Review 16* for sale by the Museum. In the Meeting of the AWA Inc. Board of Directors, just preceding this meeting, the AWA Inc. had declared that they would donate all copies of *AWA Review* 16 to the Museum that were left over from sales at the AWA Inc. convention. This solved the problem for this year and *Review 16*. The AWA, Inc. further stated they would visit the *Review 17* donation at their May, 2004, Board Meeting.

Curator Ed Gable presented a detailed written report revealing the result of this season's opening activities, new displays, plans, collection status and budget results. By all measures the Museum continues to grow and do well with the exception of progress with the implementation of the newly revised Past Perfect Software. Ed Gable is taking a focused, personal and hands-on lead position in bringing this activity to a successful conclusion. A copy of the report was issued to all Trustees and a copy filed with the Secretary.

Ed Gable reported that percolation testing at the Annex property had failed. This means an extraordinary septic system would have to be installed in order to use the property for a public building. Estimates for an appropriate raised-bed system were in the area of $15,000.

Followed a long discussion on the museum status and how the museum might look in the future. Visions went all the way from building a modest, but acceptable, museum on our Annex property to buying large school buildings in the vicinity. Other considerations expressed were the increasing property values in our area, the proposed upgrade to Route 5&20 in front of the Annex, and a proposed car wash at the corner of Route 444 and Routes 5&20.

Director Peterson asked for new business to be brought before the Board and there being none, Trustee Hopkins moved to adjourn, seconded by S. Avery. Approved.

EDWARD M. GABLE
Secretary

AWA ELECTRONIC COMMUNICATION MUSEUM
PROFIT AND LOSS
November, 2002 through October, 2003

Ordinary Income/Expense	
Income	
6008M CONTRIBUTIONS - BUILDING	2,612.00
6010M MUSEUM STORE INCOME	484.45
6020M INT ON BANK ACCOUNTS - MUSEUM	7,640.72
6024M AWA PUBLICATION INDEXES	85.00
6025M DISPLAY ADS IN OTB - MUSEUM	915.00
6030M AUCTION PROCEEDS	2,252.73
6036M CONTRIBUTIONS - MUSEUM	2,540.30
6039M SPRING MEET INCOME	60.00
6041M OLD CONF. OTB/REVIEW BK SALES	1,033.00
6070M SURPLUS EQUIPMENT SALES	1,967.29
6072M ARTIFACT ACQUISITION FUND	4,615.00
6802M OLD OTB & REVIEW SALES	8,264.74
6806M CD ROM SALES	1,393.10
Total Income	33,863.33
Gross Profit	33,863.33
Expense	
8001M Bank Service Charge	222.10
8014M COMPUTER SUPPLIES - MUSEUM	971.71
8016M COMPUTER SOFTWARE - MUSEUM	253.00
8022M DEPR. ON ANNEX	3,414.84
8025M MUSEUM SUPPLIES	87.43
8027M MUSEUM RENT	1,000.00
8028M MUSEUM STORE EXPENSES	700.00
8030M INSURANCE-FINE ARTS COLLECTION	2,535.81
8031M INSURANCE - FIRE,THEFT-MUS,ANN.	1,024.90
8032M DEPR. ON COMPUTER	528.36
8034M INSURANCE - BUILDING	535.00
8035M NEW BUILDING FEASIBILITY STUDY	450.00
8060M GENERAL POSTAGE	562.13
8061M GROUNDS KEEPING	150.00
8062M GAS	1,011.20
8063M ELECTRICITY	1,450.63
8064M WASTE WATER SERVICE	310.00
8065M OFFICE SUPPLIES	212.45
8067M ACCOUNTING	1,299.00
8069M BUILDING MAINTENANCE	644.20
8072M ARTIFACT ACQUISITION. FUND	542.50
8073M LIBRARY BOOKS	39.49
8074M LOCAL CONTRIBUTIONS BY MUSEUM	60.00
8075M ALARM SYSTEM	102.00
8090M SPRING MEET EXPENSES	209.50
8115M ADVERTISING AND PHOTOGRAPHY	292.83
8130M VOLUNTEER APPRECIATION	496.22
8150M MEMBERSHIPS	50.00
8155M WATER	56.00
8160M TELEPHONE	1,039.66
8167M OTB & REVIEW SALE SUPPLIES	94.27
8168M OTB & REVIEW SALE POSTAGE	624.83
Total Expense	20,970.06
Net Ordinary Income	12,893.27
Net Income	12,893.27

AWA ELECTRONIC COMMUNICATION MUSEUM
BALANCE SHEET
As of October 31, 2003

ASSETS	
Current Assets	
Checking/Savings	
1080 HSBC CKING - MUSEUM	48,822.39
Total Checking/Savings	48,822.39
Other Current Assets	
Certificates of Deposit	
1115M FLEET 24 MONTH CD	15,933.92
1057M CITIBANK 36 MONTH CD	35,840.22
1111M ESL 36 MONTH CD	81,716.08
1104M ESL MONEYMAKER ACCT.	78,601.82
1042 ESL MONEY MARKET - MUSEUM	7,209.08
1043 ESL MONEY MARKET RESTR.-MUSEUM	3,971.09
1108 ESL - 30 MO. CERT.- MUSEUM	25,868.63
Total Certificates of Deposit	249,140.84
1400 PREPAID EXPENSES	
1406 PREPAID RENT	166.67
Total 1400 PREPAID EXPENSES	166.67
1600 INVENTORY	
1623 AWA REVIEW 15	16,941.00
1622 AWA REVIEW 14	10,970.43
1621 AWA REVIEW 13	4,934.43
1618 AWA REVIEW 10	2,265.75
1616 AWA REVIEW 8	596.00
1615 AWA REVIEW 7	711.00
1614 AWA REVIEW 6	562.00
Total 1600 INVENTORY	36,980.61
1330M BANK ACCT. INTEREST	2,363.57
Total Other Current Assets	288,651.69
Total Current Assets	337,474.08
Fixed Assets	
2400 LEASEHOLD IMPROVEMENTS	5,386.38
2405 STORAGE BUILDING	88,549.02
2450 DEPR. RES ON STORAGE BUILDING	-44,153.48
2499 DEPR. ON ELECTRONIC COMM. MUSEU	-5,386.38
2500 LAND - LEGION PROPERTY	16,562.89
2510 COMPUTER EQUIPMENT	2,641.98
2545 DEPR. RES. ON COMPUTER EQUIPMENT	-2,641.48
Total Fixed Assets	60,958.93
TOTAL ASSETS	398,433.01
LIABILITIES & EQUITY	
Equity	
3900 NET ASSETS	385,539.74
Net Income	12,893.27
Total Equity	398,433.01
TOTAL LIABILITIES & EQUITY	398,433.01

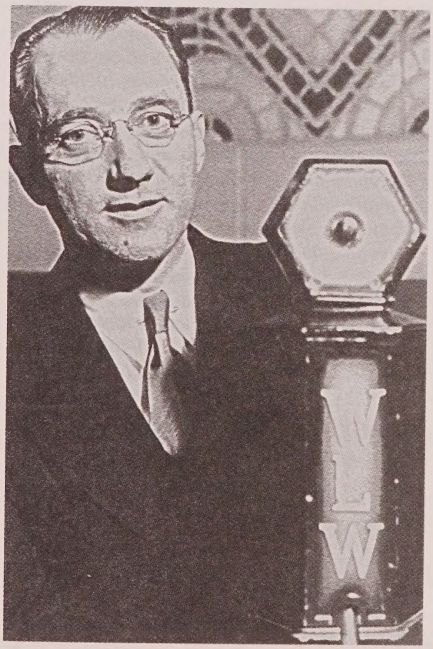
MICS AND MEN

EDITED BY **GEORGE A. FREEMAN** WITH **JANET DELL FREEMAN**, 102 E. MAIN ST., MADISON, IN 47250-3411. PHONE: (812) 265-6878. E-MAIL: RALOGEUM@AOL.COM.
PLEASE INCLUDE SASE FOR REPLY.

The Mic: The WLW Condenser
The Man: Arthur Ainsworth

For years this microphone has been on display at Jack Gray's Cincinnati, Ohio museum, its manufacturer listed as "unknown." Was it designed by R. J. "Rocky" Rockwell, later VP and Director of Engineering for Crosley Broadcasting? The deco stenciling on the wall in the background of this picture suggests it's in the new Arlington St. studios completed in the early 1930s.

Rockwell joined Crosley's staff in the mid '30s according to former WLW engineers Charlie Stinger and Clyde Haehnle. Could he have been moonlighting for Crosley in the late '20s while on the payroll at General Electric? He was working at G.E. during the development of the condenser mic that, in 1927, became RCA's Model 4A.



Arthur Ainsworth at the WLW microphone. (model unknown)

There's no mystery about the man behind the mic. Arthur Ainsworth began his career in 1924 at his brother Leo's station in Cincinnati (WFBW). The station was owned and operated by the Ainsworth-Gates Radio Company and used to promote their "Ranger Five" battery sets. At first Arthur stuttered, finding he could not pronounce the word "compliment."(1)

But the job seems to have made the man. He made fewer and fewer mistakes, gathered confidence, and was designated manager/announcer.

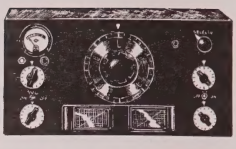
WFBW was re-named WMH, the original call of The Precision Equipment Co, also in Cincinnati. When the station was sold to Kodel Radio Corporation and became WKRC, Ainsworth moved to WCKY, Covington, KY (Cincinnati metro), then worked at several Los Angeles stations, then returned to Cincinnati to join Crosley's WSAI and WLW.

His deep, clear voice became one of Cincinnati's best known and most professional as he aired such local WLW programs as *Moon River*, and was heard on network programs, such as *The Studebaker Champions*, originating at WLW. He also hosted programs featuring such soon-to-be-famous performers as The Mills Brothers. Arthur died in 1953 at age 58.

NOTES

(1) Author's November, 1994 interview with Gladys Ainsworth Wells, daughter of Leo Ainsworth.

THE COMMUNICATIONS RECEIVER



EDITED BY **WILLIAM FIZETTE, W2DGB**, RR 1, BOX 55, HENRYVILLE, PA 18332
PLEASE INCLUDE SASE FOR REPLY.

The RME-69 — Most Famous of its Line

By Jim Hanlon, W8KGI

Once again communications receiver enthusiast and historian Jim Hanlon returns to the OTB pages, this time with a discussion of a very famous receiver, the RME-69. His interesting story adds a personal element not usually found in this column. Please read on.—W2DGB

According to Raymond Moore in his book, *Communications Receivers, the Vacuum Tube Era*, the first "modern" communications receiver built was the RME-9. This radio was introduced in December 1933 by E. G. Shalkhauser, W9CI, and Russ M. Plank, W9RGH, the "Radio Manufacturing Engineers" of Peoria, Illinois.

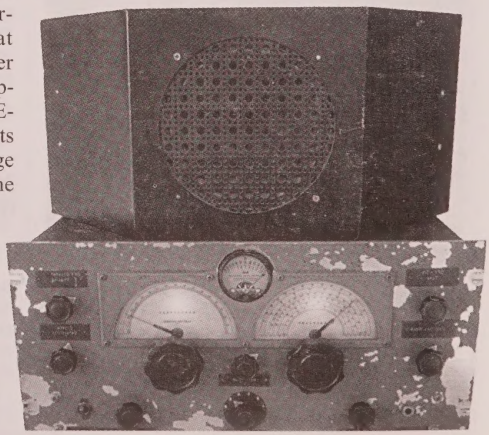
The set featured one RF amplifier stage, separate local oscillator and mixer tubes, two IF amplifiers with a crystal filter, a beat frequency oscillator, AVC on both phone and CW with a calibrated signal-strength "R" meter, bandswitched coverage from 550 kHz through 20 MHz in five ranges, a calibrated, "airplane" tuning dial with mechanical bandspread, and a built-in power supply.

Only about 100 RME-9s were built (in Shalkhauser's basement according to Moore) before the design was upgraded in 1934. The RME-9D had a second bandspread tuning capacitor with its own arbitrary-calibration-scale "airplane" dial, and a "resonator" control that peaked the adjustment of both the RF amplifier and the mixer stage. That radio was soon upgraded again, in November 1935, to the RME-69. The upgrade added a sixth band to extend its coverage to 32 MHz, and the general coverage and bandspread dials were changed from the round, "airplane" style to larger, half-circle dials that had more room for calibrated scales and were easier to read.

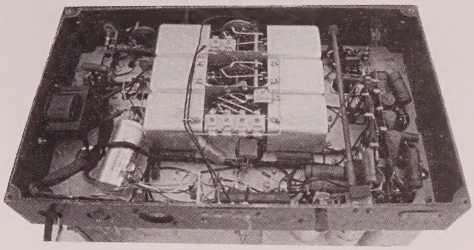
Six-volt tubes of the 6C6, 6D6, 6B7 and 42 variety replaced the earlier 2½-volt tubes of the RME-9 and 9D. The RME-69 was the most popular radio RME ever built. It stayed in production until 1940, and Moore estimates that about 6500 were sold.

I found my RME-69 in an August 1979 classified ad in the *Columbus* (Ohio) *Dispatch*. The radio bears serial number HA4 and, since it received its final manufacturing test on 2/27/40, it is one of the last of the run. I was able to track its history because of an Ohio State University property tag that it still wears on the back of its cabinet.

The RME-69 had started out in life as a bridge-detector receiver in the Electrical Engineering Department labs, probably purchased by Professor Bob Higgy, W8IB. It was retired from that job in the early 1950s when Professor Jim Gilbert bought a new bunch of HRO-50s and -60s for the department. Professor Dean Davis acquired it and passed it along to his father-in-law. Both Jim and Dean were hams, of course. After his father-in-law died, Dean sold it to the person in Delaware, Ohio, who later sold it to me. So I am the fourth, and at this point the longest-term owner of this particular receiver.



The W8KGI rack-mount version of the RME-69 with the unique RME speaker. The paint on the front panel is in very bad shape, possibly due to poor surface preparation during manufacturing. However, the receiver still works just fine.



Below the chassis of the RME-69. Note the cast-metal chassis. All capacitors are original except for the added electrolytic.

According to my September, 1979 notes in the instruction manual, the '69 responded favorably to alignment and proceeded to go to work in my hamshack. I did not have to replace any of its paper bypass capacitors then or since. I didn't open up the radio again until October of 1980 when I was looking for the source of some hum that was particularly annoying on 15 and 10 meters.

Swapping out the 6D6 local oscillator tube made some difference, but the hum was still there so I thought I would check out the health of the power supply filter capacitors. There was no can mounted on top of the chassis, and the manual has no picture or mechanical diagram of the under-chassis area, so I was having a little trouble finding the capacitors.

After a little looking around, I noticed an area where the wiring under the chassis was bent to clear a rather large, circular-shaped component, but that component wasn't there. The filter capacitor unit that I couldn't find was actually missing, and I'd been running the receiver quite satisfactorily for a year without it! Needless to say, addition of replacement cleared up my hum problem completely.

The RME-69 is an interesting receiver from several perspectives. It is mechanically very solidly built.The chassis, for example, is an aluminum casting that is quite rigid. The coils, located below decks adjacent to the bandswitch, are all encased in sturdy shield cans. My receiver is a rack-mount model, and its panel is a ¼" inch thick aluminum sheet. This radio was built to take a lot of punishment and keep on working.

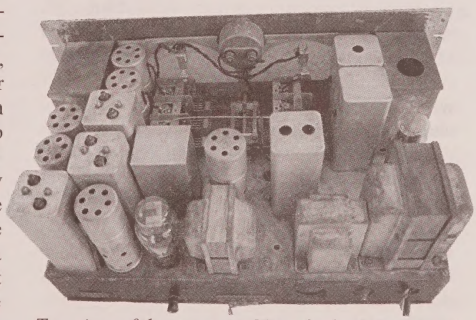
The front panel, which is original, is a grey crackle paint. It is now flaking off in large splotches. One of these days I may remove the panel and strip and repaint it if I can find a crackle paint that I like. One peculiarity about the RME-69 is that the receiver originally came without any labels on the knobs. It's fairly obvious that the two large knobs below the main tuning and bandspread dials are for tuning, and that the knob below and between them is the bandswitch, but there was no hint of the function of the other knobs on the panel. On my particular receiver, this mystery was dispelled by a set of engraved labels added by a technician at the Ohio State EE Department so that the students wouldn't be confused.

The RME-69 does a very credible job, even today, as an amateur or SWL receiver. It is stable, with negligible drift after about 15 minutes of warm-up. Thanks to its resonator control, it is sufficiently sensitive to hear antenna noise all the way up to 30 MHz. Images are 55 dB down on 20 meters, but only 20 dB on 10 meters—typical of a single conversion receiver of its day.

Its bandspread is quite generous, 18 turns of the bandspread knob to cover 160 meters, 26 turns for 80 meters, 12 turns for 40 meters, nine turns for 20 meters, six and a half turns for 15 meters, and nine turns for 10 meters. That's better bandspread than my HRO-50 has on every band, except for 15 meters!

Its selectivity is satisfactory for AM phone in the amateur and shortwave bands, and the crystal filter provides variable selectivity and a phasing notch for use on CW or when the phone bands get crowded. However, the skirt selectivity when the crystal is switched in is noticeably poorer than that of my National HRO in the same mode. This is probably due to stray coupling around the filter.

Another peculiarity of the RME-69 is that the amount of BFO signal coupled into the second detector for CW operation is, by design, relatively low. The R-meter only goes up to R3 when the BFO is turned on with the AVC operating. The manual explains that this low injection level produces less noise on CW reception and that it allows the AVC to be used to cut back higher-level CW signals automatically. In contrast, the HRO's BFO injection pins the S-meter. Conse-



Top view of the receiver. Note the high density of the layout. There is very little room for any additions above the chassis.

quently the AVC must be disabled and the RF gain control used for the volume control on CW.

The RME-69 also includes a unique, "monitor" feature. When the RF gain control knob is pulled out from the panel, the second detector is switched away from the IF output to a separate monitor antenna terminal on the rear apron of the chassis. An amateur operating AM phone could connect a short antenna to that terminal and listen to his modulation on the air.

If you acquire an RME-69, be prepared for its 4000 or 600-ohm audio output impedance. If you want to drive a speaker, look around for a matching transformer, or better yet, an original RME speaker. (NOTE: The uniquely shaped stand-alone speakers, in contrast to the receivers, are scarce items. *(The rack-mount speakers may be just as hard to come by. —ed.)* Plugging in headphones cuts off the 4000-ohm output but not the 600-ohm line. You may want to change this if you are using a 600-ohm to voice coil-matching transformer like I am.

The RME-69 instruction manual is quite interesting, and is really a very good engineering tutorial on superhet receiver design. Strangely though, it does not include any instructions on how to do an alignment, even though all of the normal adjustment points are there. This omission and the lack of labels on the controls suggested to me a certain "attitude" about the RME-69's maker. I was lucky to be able to investigate this further at the Dayton Hamvention in 1981.

It was a sunny, Saturday afternoon at the Hamvention, and I was a little tired after my double round of the flea market and fighting the crowds inside the arena. I retreated to a little grassy spot outside and sat down for a rest. There were a couple of old timers having an "eyeball QSO" out there, and I soon joined them. To my utter surprise and delight, one of them was "Shaw" Shalkhauser, W9CI, a founder of RME!

Shaw turned out to be very sure-of-himself, with definite strong opinions, just as I had come to expect. There were no labels on the RME-69 controls, Shaw explained, because any user worth his salt would soon learn what they were and how to operate them. Likewise, anyone who did not already know how to align a superhet had no business messing with his radio.

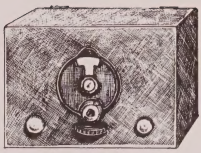
I complemented Shaw on the thoroughness of his manual. In a later letter that included an "eyeball QSO QSL," he said: "Most of the manuals in the early RME days were composed right on my desk with the assistance of the engineers supplying their lab data as necessary. Hams were very particular about the inner workings of equipment back in the tube days. We answered many more questions direct from the factory than is done today. As you can see, it was possible to make your own repairs in the equipment after checking the manual. This is hardly possible with our modern units unless one wishes to tackle it."

Shaw's letter appears to have been typed on the same machine that was used for the RME-69 manual. His stationary announced that he was a Fellow of the Radio Club of America and QCWA life member number 8873. His QSL says, "Hooked-Branded Inoculated since 1912," and it lists his calls as "1915, MLA; 1916, 9AHO; 1920, 9XAF; 1921 9YAN; 1922, W9CSZ; 1952, W9CI." I treasure Shaw's letter and QSL only slightly less than our eyeball QSO as one of the best experiences that I have had as a collector of vintage amateur radios.

Because there were so many RME-69s built, and because they were so sturdily constructed, there are still quite a few of them around. If you are looking for a vintage receiver that will still turn in a very credible performance in more than just the occasional AWA contest, be sure to keep your eyes open for an RME-69.

The success of the RME-69 in the market place inevitably led to tinkering with the circuit and the introduction of variants. Along with other changes, the RME-69/LS-1 increased the tube complement to 11 tubes, replacing the two 6D6 IF tubes with a 6L7 and a 6K7 as well as adding a two-tube noise circuit. In 1936 this LS-1 noise silencer was also offered as an add-on to retrofit earlier '69 models. The RME-69/Battery was offered as an alternate to AC line power, and the RME-69/DB-20 incorporated the receiver and a DB-20 preselector in one long cabinet. The usual layout had the preselector on the left side of the cabinet, but I have seen one version with the preselector on the right, possibly a special order. A relay-rack model with a smooth gray finish and a matching speaker is shown in the November 1936 QST.

The RME-69 Single-Signal Super was announced in the October and November 1935 issues of R/9 *and in the November 1935* QST. *Detailed ads with photos appeared in December, with the one in* R/9 *showing the receiver next to its speaker in the trapezoidal cabinet, both in gleaming black crackle finish. While other publications were not checked, it is a safe bet that all the 1935 major information sources were used by RME to get out the story about this new receiver. Readers were invited to send for* Bulletin No.69. *RME advertised the receiver heavily in 1936. The Great Depression was at its peak, there were only just-so-many dollars out there for this type of product, and RME went after as many as it could snare.—W2DGB*



1929 QSO Party Results for 2003

The Bruce Kelley Memorial 1929 QSO Party got off to a mixed start on November 28, due to very bad QRM from a worldwide CW contest held the same weekend. I'm afraid that I got complacent with the scheduling. The 3.550 to 3.580 band segment has been so quiet over the last five years that I neglected to check with the contest manager at ARRL. However, even if I had checked, I don't know where we could have moved to as other weekends are also a problem. Maybe it will all go away next year. Hi.

In spite of the QRM some of our stalwart AWA operators persevered and racked up very credible contact tallies in the East and Central regions. The West Coast members all reported very difficult conditions during the first period due to the above mentioned contest QRM.

Propagation conditions appeared to be very favorable for the entire eastern half of the U.S. However, East-West propagation was apparently very poor. No one reported any East-West contacts on either weekend.

Beautiful homebrew "1929" station of Eddy Swynar, VE3CUI. QST 12-tube superheterodyne receiver (left, above; right below) and 3-tube MOPA (right, above; left, below)

A total of 53 logs were received, down from 59 received last year. As usual a few of our members neglected to send their logs in. Come on guys!

There are some continuing changes in the equipment make up, as reported by Eddy, VE3CUI.

Hartley 35%	Colpitts ...2%
MOPA 28%	Other 16%
TNT 19%	

Another change noted is an increase in the number of vintage receivers in use, all the way from single tube O1A regen sets to early multi tube "power houses." There were a few new calls in the test and judging by the enthusiastic comments in their logs, they had a good time. Welcome. I also received several photos of rigs used in the test. These pix are always delightful to study.

One set of pictures, which I'm including here, came from Eddy Swynar, VE3CUI, and show his entire home brew station. The pictures of his 1929 *QST* twelve tube superheterodyne are incredible! He reports good performance from this masterpiece. Congratulations Eddy.

Another great photo was sent in by Lou, VA3AWA. It depicts one of the nicest "1929" TNT oscillators I have seen. Beautifully made with great attention to 1929 detail. Thanks Lou. I hope to submit this photo to our Editor for publication in a later *OTB*. I always enjoy receiving and studying photos of members' projects.

Thanks to everyone for making the '29 QSO Party successful. Hope to see you all in the Linc Cundall Memorial Contest.

73,

John F. Rollins, W1FPZ

THE TOP TEN SCORES

Call	Contacts	Call	Contacts
W2IRS	48	K4LJH	35
WA3FFC	47	N4GJV	34
KJ8L	47	NE1S	32
VE3CUI	43	VE3DKW	32
W2AO	38	W1TSP	31

COMPLETE PARTICIPANT LIST

CALL	TRANSMITTER	POWER	QSOS
W-1			
KC1FB	'29 MOPA 27 OSC/27 PA	6W	6
NE1S	'29 TNT (PP45s)	9W	32
W1TSP	'29 HARTLEY	10W	31
NX1B	'29 HARTLEY	9W	2
K1FI	'27 MOPA 210 OSC/210 PA	9W	24
NV1X	'29 TPTG 45	8W	9
W1GIG	'29 PP TPTG	8W	15
W1FPZ	'29 MOPA 210 COLPITTS/210 PA	10W	15
W1DDW	'28 MOPA 201 OSC/203 PA	10W	24
W-2			
WA2NPL	'29 UX-211 HARTLEY	10W	19
W2HBE	'29 HARTLEY UX245	8W	4
N2TWW	'29 TNT 01A	5W	18
KE20	'29 TNT 01A	5W	22
N2VO	'29 TPTG	10W	19
W2CQH	'29 MOPA 210 OSC/210 PA	10W	5
K2KK	'20 HARTLEY	4W	15
W2IRS	'29 HARTLEY 211	10W	48
N2JPR	'29 HARTLEY	10W	11
WB2AWQ	'21 TWIN HARTLEY UV202	1W	17
W2DGB	'29 TPTG	9W	5
W2AO	'29 HARTLEY 210	10W	38
W-3			
W3FJJ	'29 HARTLEY 45	9W	7
K3DZ	'27 MOPA XTAL OSC	8W	22
W3VVS	'29 HARTLEY	9W	20
W5WS/3	'28 MOPA	10W	26
WA3FFC	'28 MOPA	10W	47
WB3HLH	'29 TNT 10	10W	16
W-4			
WA4IAM	'29 TNT	2W	9
K4JYS	'29 TNT CX301A	2W	18
N4GJV	'29 MOPA 841 OSC/841 PA	10W	34
AA4RM	'29 PP HARTLEY	9W	10
K4LJH	'29 HARTLEY 211	10W	35
W-5			
K5RB	'29 HARTLEY	10W	9
W-6			
W6DJX	'29 TNT 210	10W	7
W6TDP	'29 HARTLEY 203A	10W	2
W-7			
W7DRA	'29 TNT 211	10W	1
W7LOG	'29 TNT 45	9W	1
W7LNG	'25 HARTLEY 203A	10W	5
W-8			
KJ8L	'25 TPTG 210	10W	47
W8KGI	'29 HARTLEY UX-210	10W	2
W8IVF	'29 HARTLEY 865	10W	17
W8ZNX	'29 TNT 211	20W	29
K8JWR	'29 MOPA 27 OSC/27 PA	10W	18
K8JWR	'29 COLPITTS	10W	15
WD8OFB	'29 HARTLEY 210	5W	2
W-9			
AA9DH	'29 HARTLEY	4W	7
W-0			
KD0AR	'29 MOPA 245 OSC/245 PA	10W	16
KB0ROB	'29 MOPA 10 COLPITTS 10 PA	10W	29
VE			
VE3BHW	'29 HARTLEY	5W	6
VA3AWA	'29 TNT UV210	10W	24
VE3DKW	'29 MOPA HARTLEY OSC/AMP	10W	32
VE3RSA	'29 HARTLEY	4W	21
VE3CUI	'29 MOPA 227 OSC/PR227 AMP	10W	43

AWA 30s Night for 2004

Last year we held the first "30s Night" as the beginning of a process that will ultimately lead to a fourth enjoyable on-air event for AWA OT operators. As you might expect, we learned a couple of things from that test. Combining those lessons with your comments at the Conference, we have come up with the next step in the evolution of this event.

First, it was generally agreed that cross-mode AM to CW contacts and vice versa did not work well. Since there are currently three all-CW events, we will drop the CW portion of 30s night and make it an all AM event. Second, we will add the 20- and 40-meter bands to better accomodate the West Coast OT operators and make DX contacts more feasible. Lastly, we want to simplify a scoring process that was overly complicated.

All these things taken into account, here's our improved version of the event for this year. The rules for this contest will be the same as those of the Linc Cundall OT contest held in January by John Rollins, W1FPZ. Since that is our flagship contest event,the rules will be pleasantly familiar to our regular contest participants and easily understood by newcomers.

The only changes will in be the mode (now AM only rather than CW) and in the frequency ranges (specified below). Note that only equipment or circuits manufactured or designed between January 1, 1930 and January 1, 1940 are counted as OT gear

for scoring. Log sheets will be sent out by Randy Haus to regular OT contest participants during the third week in February.

•*Dates and times:* This year's contest will run for 24 hours. Start at 2300 UTC on Thursday, March 11th and end at 2300 UTC on Friday, March 12th, 2004.

•*Objective:* Contact the greatest number of AWA members. When calling, use "AWA AWA this is W2DGB calling" or something similar. On contact, exchange signal report, year(s) of equipment, name and state.

•*Rules:* A station will be scored only once in each band. Non-member contacts and members not submitting logs will not count.

•*Frequencies:* 3875 to 3895, 7275 to 7295 and 14276 to 14296 kHz.

•*QSO Zones:* "E" Eastern zone, US Districts 1, 2, 3, 4, 8, 9, plus VE1, VE2, VE3; "W" Western zone, US Districts 5, 6, 7, 0 plus VE4, VE5, VE6 & VE7; "DX" zone, all others.

•*QSO points per contact by zone*: "E" to "E" or "W" to "W": 1 point; "E" to "W" or "W" "E": 2 points; "E," "W," or "DX" to "DX": 3 points.

•*Equipment Multipliers:* Equipment or circuits manufactured or designed between January 1, 1930 and January 1, 1940 are counted as OT gear. Equipment or circuits manufactured or designed after January 1, 1940 are counted as MOD. Mod TX and RX=1; OT TX or RX=2; OT TX and RX=3.

•*Power multipliers:* Input to final up to 4.9 watts=4; 5-24.9 watts=3; 25-100 watts=2; 100+ watts=1.

•*Determining total points per QSO:* (1) Find the QSO points for the contact. (2) QSO points × your equipment multiplier × your power multiplier = total points for the contact.

•*Scoring examples:* **Example 1:** N9CQX contacts W1FPZ. Both are in the "E" zone for 1 QSO point. Both have OT TX and RX for a 3 multiplier. Both are operating at 10 watts for a 3 multiplier. 1 pt. × 3 × 3 = 9 points for each operator. **Example 2:** K6TQ contacts W1GIG. "W" to "E" contact for 2 QSO points. K6TQ has OT TX and RX with 20 watts. W1GIG has OT TX, MOD RX with 50 watts. K6TQ's points: 2 × 3 × 3 = 18 points. W1GIG's points: 2 × 2 × 2 = 8 points.

•*Logs:* Send all 30s Night contest logs to Marc Ellis, N9EWJ, at P.O. Box 1306, Evanston, IL 60204-1306 by May 1st, 2004.

The 2004 Linc Cundall Memorial OT DX Contest

A Memorial to Linc Cundall W2LC

The annual OT DX Contest will take place in April, 2004. This contest, held on 40 and 20 meters gives the West Coast and DX Old Time operators a more favorable chance to participate and accords higher point earning status to the great rigs and circuits of the 1950s and earlier. The 2003 OT DX contest was a great success, with thirty-five participants and a Connecticut operator, Parker Heinemann, W1YG taking 1st prize.

Again, equipment or circuits designed before January 1, 1960 will be counted as OT gear in scoring. You will notice that the twenty-meter contest window has been narrowed by five kHz. That should make it a little easier for us to find each other on this band. Log sheets will be sent out to regular AWA contest participants during the third week of March, 2004. As always, there may be some omissions, so if you don't receive an OT DX Contest Log by April 3rd, 2004, please write to Randy Haus, KB2PLW, P.O. Box 665, 303 Pennsylvania Avenue, Trumansburg, NY 14886.

•*Dates and Times:* 2300 UTC Wednesday, April 14 to 2300 UTC Thursday, April 15 and 2300 UTC Saturday, April 17 to 2300 UTC Sunday, April 18, 2004.

•*Objective*: Contact the greatest number of AWA members. When calling, use "AWA AWA AWA de KB2PLW" as an example. Once contact is made, exchange RST, name and year of equipment (such as "TX 55" for a 1955 transmitter and "RX 38" for a 1938 receiver. Send "MOD" for 1960 or later gear.

•*Rules*: A station will be scored only once on each band. Non-member contacts and stations not submitting logs will not count.

•*Frequencies:* 7030-7050 kHz and 14050-14070 kHz, ±QRM.

•*QSO Zones:* Same as for 30s Night contest.

•*QSO points per contact by zone*: Same as for 30s Night contest.

•*Equipment Multipliers:* Same as for 30s night contest, except that equipment or circuits manufactured or designed before January 1, 1960 are counted as OT, later equipment or circuits are counted as MOD.

•*Power multipliers:* Same as for 30s night contest.

•*Determining total points per QSO:* Same as for 30s night contest.

Awards: Plaques will be given out at the AWA Conference in September.

•*Logs:* Send your logs to Randy Haus, KB2PLW, P.O. Box 665, 303 Pennsylvania Avenue, Trumansburg, NY 14886. Please mail by May 15th.

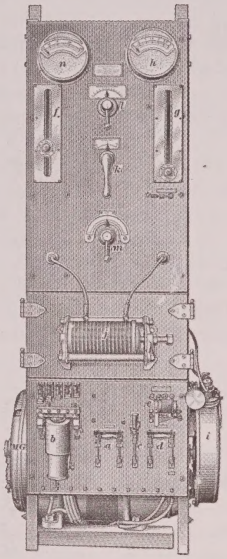
BY RONALD R. THOMAS

THE RADIO SPECTRUM: UTILIZING A SCARCE RESOURCE

The radio spectrum has always been a scarce, valuable resource. Over the years, a small number of technical innovations have had a tremendous impact on its effective utilization by amateur and commercial operators. These innovations have improved the bandwidth and stability of radio signals, enhanced frequency sharing, and made it possible to utilize ever-higher frequencies. Unfortunately, the importance of these innovations has long been forgotten. However, without them, radio communications would never have been practical.

The 1900s

In the early 1900s, amateur and commercial radio operators used spark to generate radiotelegraph signals for two-way communications. Those spark signals were very broad and used a great of the radio spectrum. Tuned circuits helped to make the signals much less wasteful of spectrum space. Tuned circuits were created by combining capacitors and inductors to resonant at a specific frequency for transmission and reception.



Typical 2kW marine spark transmitter of the early 1920s.

From the very beginning of radio, there has been frequency sharing with its associated interference problems. Sometimes sharing has consisted of simply listening before transmitting on a shared frequency. In other cases, sharing has relied on distance to achieve effectiveness; two stations on the same frequency might be far enough apart to avoid interfering with each other.

Early radio operators developed good listening skills and were able to hear weak spark signals through the interference from other stations. Those operators simply accepted the situation as they found it and made the best of it.

During World War I, amateur radio operators were forced off the air, which somewhat reduced the interference problems. However, after the war ended, amateurs were once again allowed to resume operations and many of the old interference problems returned.

The 1920s and 1930s

In the 1920s, interference problems were somewhat reduced when spark signals were replaced by tuned circuit, vacuum tube generated continuous wave (CW) signals. Those signals were narrower and more stable than spark signals, and they more efficiently utilized the radio spectrum for two-way radiotelegraph communications.

By using a variable capacitor with an inductor, a radio signal could be generated over a small range of frequencies. Plug-in inductors (coils) enabled other frequency ranges to be selected. Ultimately, plug-in inductors were replaced with permanently-installed inductors wired to a switch, which simplified the selection progress.

Vacuum tubes were able to generate signals at much higher radio frequencies. This opened up a whole new portion of the radio spectrum at the short-wave frequencies and eventually at the very high frequencies (VHF) and ultra high frequencies (UHF).

During the 1920s, one temporary solution to the interference problem was to move the amateur radio operators to the short wave frequencies, which were deemed useless for long distance communications. Amateurs soon discovered that those frequencies were actually extraordinarily well suited for long distance communications, and commercial operators also started using them.

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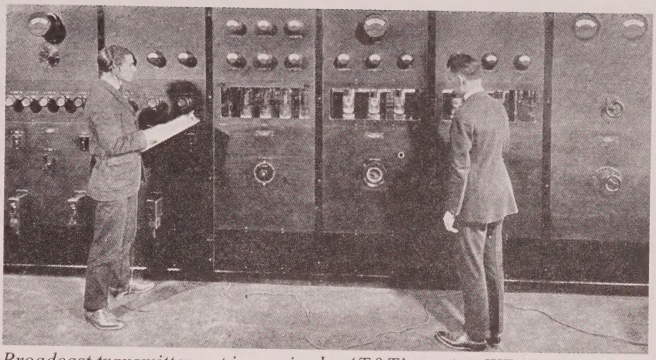
During that era, frequency stability continued to be an ongoing problem. With changes in temperature, the resonant frequency of a tuned circuit can also change and cause a transmitted signal to drift from its original frequency. In addition, exact frequency selection is difficult with a variable capacitor. Therefore, in the 1920s, more effective vacuum tube transmitters were created by utilizing quartz crystals for precise frequency control. Amateur radio operators did some of the pioneering work in this area.



Broadcast transmitter put in service by AT&T's station WEAF in 1924 was the first to incorporate crystal control.

During this period, amplitude modulated (AM) radiotelephony came into existence for two-way voice communications. These signals were much broader than radiotelegraphy signals, and interference problems became even more of a concern. AM also began to be used for a new activity called "broadcasting" (one-way communications for entertainment and educational purposes).

By the 1930s, frequency stability on the AM broadcast band became extremely important. Listeners did not want to search for their favorite station or deal with interference from other stations. Program sponsors wanted AM broadcast reception to be as simple as possible. Therefore, the quartz crystals in AM broadcast transmitters were often mounted in ovens to control their temperature, which further improved their frequency stability.

In the 1920s and 1930s, directional antennas began to play an important role in improving the utilization of the radio spectrum. Particularly in the AM broadcast band, there was a need for more stations to be able to operate without interfering with each other. AM directional antennas helped to reduce interference and improve frequency utilization. Directional AM antenna systems use two or more vertical radio towers and associated tuned circuits to achieve a directional radiation pattern. Larger systems, using six or eight towers, can create a very complex pattern that protects a number of other stations, on the same frequency, from interference.

Directional antennas also came into existence for use on the short wave frequencies and eventually on the VHF and UHF bands. Some of those antennas were physically fixed and used electrical techniques to obtain a directional capability, while others were physically rotated.

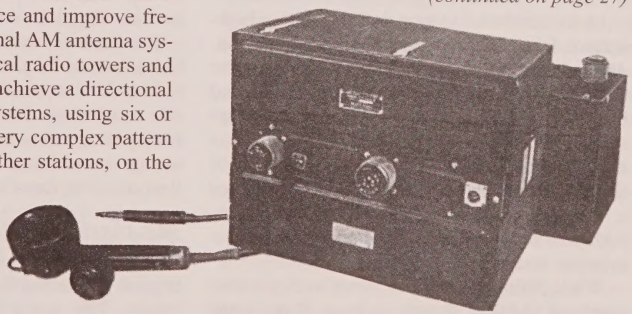
On the receiving side of the equation, the creation of superheterodyne receivers provided-single knob tuning and improved the ability of receivers to reject interfering signals. Those receivers quickly became very popular with amateur and commercial radio operators as well as AM broadcast home listeners and remain the standard even today.

1940s and Beyond

During World War II, there was a significant move by the military services toward VHF and UHF operations, which opened up more frequency spectrum. After the war, two-way radio and broadcast television transmissions heavily populated those frequencies.

In the 1950s, crystal control was commonly used for VHF and UHF operations. Unfortunately, using one crystal per frequency was an

(continued on page 27)



Famous World War II SCR-522 transmitter/receiver covered 100-156 MHz, had four remote-selected crystal-control channels.

BY AL SMITH (SILENT KEY)

EXPERIENCES IN EARLY BROADCASTING

This article comes to you through the courtesy of Jack Iverson, K0EWV. Jack took me aside during the Antique Radio Club of Illinois Radiofest XXII Meet (held last August in Elgin, IL) and handed me a manuscript to look at. It was an autobiographical piece written by Al Smith, an old friend of his who had since passed on. Jack wanted to see it published and asked if The OTB *would be interested.*

I took it to a quiet corner of the hotel and began reading. It was written back in January, 1990 and traced Al's career in radio broadcast engineering, beginning from the early awakening of his interest in radio and following his struggles to obtain work during the Depression and his progression to more and more responsible jobs in the Industry.

I don't know if Al was ever a member of AWA or if any of our present members knew him. But people who lived and worked during Al's era are rare today and the ones who are still around are leaving us fast! I felt his story would be worth preserving and am pleased to include it in this issue.

Al was not too careful about giving the states in which some of the cities mentioned are located. But it's a fair bet that most—other than Sioux City, where I believe many of the street locations mentioned are to be found—are in Nebraska, where he spent much of his working life.

Though Al's comments have been somewhat edited for brevity, I've tried to include all of the names of people he came in contact with. If any of the names or other aspects of Al's story resonate with you, let me know! I'll be glad to include your comments in a future issue—mfe.

I grew up on a farm in south-central Nebraska, becoming hooked on radio in the 1920s during visits to a neighbor who had an Atwater Kent battery "three-dialer." It took a 100-foot antenna up as far as possible, along with a long metal ground rod, to get decent reception. I remember hearing KDKA in Pittsburgh, KFX in Hastings, NE, WHB in Kansas city, WOAW in Omaha, WSB in Atlanta and even a high-powered station in Havana, Cuba. Stations sometimes shared time on the air to reduce interference, and occasionally would shift frequency without getting permission from the government. There were also special nights when the local stations would remain silent so their listeners would have an opportunity to listen for DX.

Early Radio Activities

I was introduced to ham radio through a high-school friend whose brother had a station. Around the same time (in 1930), I signed up for an NRI (National Radio Institute) course and began servicing broadcast sets—which were nearly all battery operated. In 1933, I received an amateur conditional license and became W9PEX (later and currently, W0PEX). In 1934, I received a First Class Radiotelephone license but finding a job as a radio operator in the depths of the Depression wasn't easy.

While filling several temporary and part-time positions at radio stations in Iowa, Kansas and Nebraska, I continued to service radios in my home town. A lot of my work involved converting battery sets to use low-drain tubes to eliminate the need for a large storage "A" battery.

About then, Zenith introduced a farm set that required no "B" batteries, just a relatively small storage battery that powered everything. Those who bought this set received a certificate allowing the purchase of a Wincharger generator for $10.00. This kept the battery charged, and some farmers even managed to run a couple of house lights from it along with the radio..

By about 1935, rural areas were being electrified and farmers could buy AC sets with single-knob tuning and powerful dynamic speakers. This was the time of the "golden age of radio" with the big network evening shows like Jack Benny and Amos and Andy and daytime soaps such as "Oxydol's own Ma Perkins."

But there were still a lot of battery sets to be serviced. I would frequently load up my car with Ray-O-Vac "B" batteries and drive out into the countryside to sell them. During these sales calls, I would often pick up radios to take back to the shop for servicing. At one time, I was selling more batteries than any other Ray-O-Vac dealer in Nebraska.

My First Full-Time Job

In 1936, I finally landed a full-time engineering job at station KMMJ in Clay Center, Nebraska. This was a daytime-only station on the

frequency of WSB, Atlanta's clear channel. There was no interference between the stations during the day.

Soon afterwards, I married Helen, my girlfriend of many years. The job itself was quite interesting because almost all of the station's programming was live. Dance bands would play once or twice a week for free just to give them the exposure that would lead to paid dance dates in the area.

KMMJ had a 1000-watt Western Electric transmitter powered by a motor-generator set. A three-phase motor drove generators that produced filament, plate and bias voltages. An identical set was kept as a spare, and the use of the two sets was alternated each day. I had the daily job of cleaning and maintaining the off-line unit.

In the winter, heated water from the transmitter's water-cooled final was run through radiators to warm the transmitter room. The antenna was an "L" type run between two 150-foot, self-supporting steel towers. In the evening, when the station went off the air, the antenna was disconnected and grounded.

There was frequently a very large static electricity spark at the contacts of huge grounding knife switch when it was closed—caused by friction generated during dust storms. Dust was also a big problem in the generators and transmitter. With no air conditioning, windows had to be kept open as much as possible during the summer.

The station frequency was crystal controlled—with the crystals operated in ovens kept at 55 degrees centigrade. Still in the transmitter room, but no longer in service, was the highly accurate (within 1000 Hz) calibrated wavemeter that had been used to check frequency prior to the installation of the crystals.

Engineering at KMA

Later in 1936, I was unemployed again—probably because I couldn't copy and type 25 wpm CW well enough to copy the wire-service news reliably—a duty that was required of all station operators. I went back to repairing radios for awhile, but a few months later was employed at station KMA in Shenandoah, NE, which was expanding.

KMA had a large auditorium/studio complex set up so that the audience could watch the entertainers—this station also used all live talent. In the evening the auditorium was used as a movie theater. KMA had a huge farm and small-town audience and was into direct sales of all kinds of merchandise, from live chicks to tires, by the boxcar load.

The station was housed in a beautiful two-story building with an apartment upstairs for the chief engineer. A 488-foot vertical antenna was fed from a new 5000-watt RCA transmitter. I have vivid memories of the night when one leg of the antenna tower had to be jacked up to replace the huge insulator it had rested on—a touchy operation to say the least. The insulator had developed a slight crack that allowed moisture to enter and detune the antenna.

KMA had been a shared-time station, but obtained full-time status by buying KGBZ at York, NE, with which it had been time sharing. In the spring of 1937, I was out of a job once more, caught in a downsizing that took place after construction for the expansion of KMA was completed. But this time I was out of work for only about a week, when I went to work for KFAB-KFOR in Lincoln.

Complex Switching at KFAB-KFOR

This was quite a different type of operation. KFAB was a CBS affiliate; KFOR was a Mutual Network affiliate. However, both stations shared the same studios. To complicate matters, certain programs were sometimes fed to station KOIL in Omaha. Switching was accomplished by a preset system managed by a single operator in Master Control. The necessary changes were set up ahead of time and were accomplished, at the proper moment, by the push of a button.

These stations used some live remote programming. KFOR carried an organ concert from the Lincoln theater every day at noon. KFAB aired a multi-microphone service from a local church on Sundays, and also broadcast football games. We also fed dance bands to the networks after 10:30 p.m., a common practice among network affiliates.

It is interesting that KFAB operated on 770 kHz, the same frequency as WBBM, the CBS station in Chicago. In order to prevent interference during evening hours, both stations had to broadcast the same program and their carrier frequencies had to be maintained within a fraction of a cycle of each other. The frequencies of the two stations were locked together via an audio tone transmitted from the WBBM transmitter to the KFAB transmitter via a telephone line. Each station was given fourteen seconds out of the 30-second station breaks. If WBBM had a local program at night, it paid KFAB to remain silent during that period.

Later, KFAB traded frequencies with WJAG in Norfolk, NE, which had been broadcasting on 1110 kHz. The lower frequency helped Norfolk's local coverage, but WJAG had to remain

off the air at night. KFAB then moved to Omaha and began operations on the higher frequency with 50,000 watts of power.

The KSCJ Years

In October, 1937, we moved to Sioux City to take advantage of Chief Engineer Steve Dier's offer to join KSCJ for five dollars more a week. The KSCJ studios were located above the Westside Harness Company, which had a window display featuring a big white horse. The station opened at 6 a.m. with a recording of a rooster crow, signalling the beginning of the "Town Crier" program. This was an informal, three-hour program of information, news, interviews and recorded music hosted by Ray Murphy and Rodney Dean.

These early studios were draped for acoustical purposes. I ran the control board, playing recordings and taking phone calls. I was amazed at the number of calls received from listeners—a new experience for me. Double button carbon mikes were still in use, and they had to be tapped occasionally to unpack the granules and restore decent sound quality. We also had condenser and dynamic microphones.

Popular remote programs were *The Man on the Street*, Joe Hale's reports from the stockyards and Don Stone's "Toller Starlight Room" broadcast. We also used to broadcast corn-husking contests in the fall. To cover these contests, the telephone company would supply a connection terminated in a reel of wire mounted on our tractor-pulled wagon. Also on the wagon were a remote amplifier and an announcer who had just enough room to stand. The wire was paid out as the wagon moved across the field to follow the action.

The KSCJ transmitter had recently been moved from Prospect Hill to a site north of Leeds along Highway 75. The 5000-watt main transmitter and 250-watt auxiliary were housed in a modern building containing a small apartment. The antenna was a 300-foot, self-supporting vertical insulated from the ground. Power was reduced to 1000 watts at night.

Soon after the move, plans were underway to build new studios and also install a directional antenna to protect other stations on the 1330 kHz frequency. This would allow full-time, 5000-watt operation.

A storm took down the 300-foot vertical while construction of the directional antenna system was underway. It was replaced with a guyed 300-foot vertical—the tower for which, along with the three other towers for the new system, had been purchased from the Wincharger Corporation in Sioux City. Tuning, adjustment, and proof of performance of the array took most of 1941.

Two more towers were lost in 1941—one in a storm and one pulled down accidentally by Dr. Victor J. Andrew of the antenna design firm, who ran over a guy wire about 4 a.m. one morning, thinking it was a sunflower! After replacement of the tower, all of the tuning had to be done over again. I was Acting Chief Engineer at the time because Steve Dier, a National Guard Officer, had been placed on active duty just previous to the start of World War II.

Before the new array could be placed in service, we had to show the FCC signal measurements made from a plane circling the antenna. Finally, we received authorization to operate with 5000 watts day and night. In 1941, nearly all stations were required to shift frequency, and KSCJ moved to 1360 kHz—which is their present frequency as of this writing (January, 1990). All radio stations also reduced power to 90% of that authorized to conserve final tubes.

I was being kept very busy building new studios and assisting with the teaching of radio theory and operation at Morningside College. There was a shortage of trained technical people for the armed services and industry, and broadcast technical people were teaming up with local colleges all over the country to remedy this lack. Radio amateurs also helped the war effort in this way. I my area I recall that Dick Pitner, W0FZO, was very much involved.

After the war, there was a lot of interest in FM, and KSCJ installed a 3000-watt FM transmitter at its old Prospect Hill location. The antenna was a joint Wincharger-KSCJ experimental project. RCA had developed slot-type, tower-mounted, circular antennae, and we installed three of these slot sections on one face of a standard Wincharger triangular tower. These were fed in phase, giving an effective radiated power of nearly 10,000 watts.

The programming consisted largely of transcribed music played at the transmitter site. We would pause between numbers to show how quiet and free of interference the new mode was. The poor quality of the then-available FM receivers was a problem, and we had difficulty selling enough time to pay for station operation. after a few years, the transmitter was shut down and sold.

Transition to TV

By that time, Don Dier had returned from military service, and in 1947 I was hired by Carlton Corbett to build KCOM, a new AM station on 620 kHz south of Sioux City in NE. This would make the third AM station in the area.

I really started from scratch with this project, helping to survey the land and determine the placement of the four transmitting towers. I even got involved in the installation of the ground system, tower foundations, coax transmission lines, etc. The towers were made locally by Tower Construction Co., originally the Wincharger group. All studio equipment was Raytheon. KCOM went on the air in 1948.

The station was strong on sports and farm broadcasts. It had a number of remote pickups from neighboring towns as well as from churches in Sioux City. KCOM was sold in 1954 and is now (as of January, 1990) operating as KMNS. About this time, I became involved in the construction of another new station in the area, KTIV television.

KVTV (now KCAU), another TV outlet, had gone on the air in 1953. KTIV followed in 1954. Our studios were at 10th and Grandview and the transmitter was at 54th and Rustin Streets. The 550-foot tower was made in Sioux City by Tower Construction Co., and it was topped by a six-bay Super-Turnstyle RCA Antenna. The transmitter was a DuMont 25-kW unit, one of the first designed for color operation.

We had planned to be on the air for the 1954 World Series, but didn't make it because of the poor signal on the microwave link from the studio to the transmitter. The problem was caused by a large tree in the path, and was eventually corrected by raising the tower supporting the microwave reflector from 100 to 140 feet.

Our hours of operation were basically from 4:00 p.m. to 10:30 p.m., ending with the 10 o'clock news. The first evening shows were all NBC: *People are Funny, The Liebman Spectacular, Television Playhouse,* and *The Loretta Young Show*. We also carried such programs as *Pinky Lee, Howdy Doody, The Sid Caesar Show, Robert Montgomery Presents, Milton Berle* and *You Bet Your Life* as well as a variety of local programming. Our studio was equipped with the first Vidicon camera for movies and slides. In May of 1955, at a time when most stations were operating with less than 25 kW, we went up to our maximum authorized power of 1000 kW.

(*At this point, Al's story jumps ahead 10 years to 1965—ed)*

1965 was a year of construction, carried out in conjunction with KVTV. Translator booster stations were installed at Norfolk, Neligh, and O'Neill—in NE—to bring better TV to these communities. The translators at Spence, IA were updated. Later in the year, KTIV began operating from a 2000-foot tower east of James, IA. (Another project carried out in conjunction with KVTV.)

The tower was a complex engineering project. The FAA would not let us use existing maps to locate it. We had to survey from the original bench marks and obtain the exact ground elevation. The locations and elevations for the guy anchors had to be determined within inches because the cables were cut to length before shipping. Bob Engelhart, Chief Engineer, and I worked with Finley and Rath on all these surveys.

Since this was before the days of calculators, our math was done using 7-place log tables. We all had to agree on every calculation or we did it over. The only real accident that occurred during construction happened when I fell off a stepladder onto a concrete pier—breaking my foot. I finished the job on crutches.

THE RADIO SPECTRUM, *continued from page 23*

expensive proposition when there was a need to transmit on a large number of frequencies. Therefore, synthesizer circuitry was created to permit a small number of crystals to generate signals on a large number of frequencies.

By the mid 1950s, radio hams were adapting single sideband suppressed carrier (SSB) technology in order to significantly relieve spectrum crowding in the heavily populated amateur bands.—ed.

During the 1960s, computer technology enabled signals to be generated with extremely precise frequency control. Digital, rather than analog, tuning became common for both amateur and commercial operations.

In the 1970s, work began on cellular telephone systems, and in the 1980s these systems became large users of the UHF radio spectrum. Frequency sharing reached a new level of sophistication with the development of cellular systems. Computer control makes it possible to share a large number of cellular frequencies within the same metropolitan area. This enables thousands of people to utilize their telephones without interfering with each other.

Today, the demand for frequencies for voice and wireless data communications applications seems almost insatiable. Therefore, the radio spectrum will continue to remain a scarce resource, requiring careful utilization.

BY GEORGE A. FREEMAN

THE IVORY STAMP CLUB

Would you listen to a radio program about stamp collecting? Millions did in the 1930s. It was a time when the president of the United States, Franklin Delano Roosevelt, was well known to be an enthusiastic stamp collector. FDR bid at stamp auctions and mail sales. No matter where he went his stamp collection went along for the ride.

He had been working on his stamp collection shortly before his death at the "Little White House"in Warm Springs, Georgia on April 12, 1945. That same morning he had approved the final design with the Federal Post Office Department for a stamp entitled "Toward United Nations".

Any youngster with ten cents could join their president in the hobby. A girl or boy could buy a group of canceled stamps at a local five and ten cent store, take them home, and see if there was a great find in the bag along with the expected ordinaries.

The Ivory Stamp Club radio program was a partnership between its soap company sponsor, Cincinnati's Procter and Gamble, and H.E. Harris and Co. of Boston, MA. They pitched "Ivory Snow" and "Chipso" on the program. Listeners were invited to send in ten cents and wrappers from two Ivory Soap products for a treasure trove of stamp collecting gear! Included were a bag of canceled stamps from around the world, a stamp collecting book, hangers to mount the stamps, and a magnifier to study detail and condition of the paper collectibles.

2,700,000 listeners sent in their dimes and wrappers to become members. The show was responsible for distributing over 400 million stamps and a million stamp albums to the American public. H.E. Harris sent out the stamps and materials. That firm continues to thrive today, having added coins and collectibles to its offerings. Their website (a) has a section on company history and *The Ivory Stamp Club* is credited with helping to make the company a success.

In researching for this article I found a handsome website (b) displaying stamps honoring the life of a 15th century astronomer. These were submitted in a contest by a man who got the stamp collecting bug nearly 70 years ago by listening to the program on the NBC Blue network. *The Ivory Stamp Club* starred an Australian known as Captain Tim Healy. Healy was a real person who had allegedly traveled and explored the world. Each 15 minute program, broadcast three days a week, would focus on a stamp and its country of origin. Often there would be unusual or exotic information about the country as well as specific information about determining condition and value of the stamp. The three attractions of stamp collecting were always there: financial worth, historical information and educational value.

The Ivory Stamp Club was also known as "Captain Tim's Adventures." Here's an example of the narration: "During the World War (World War I) stamps played an important part in the work of spies. On the Ivory Stamp Club radio programs I'm going to tell you some exciting spy stories of the World War, in addition to the many adventure stories that are recalled by postage stamps." (c) The program started in 1933 and ended in 1941 when new concerns about spies swept America as prelude to World War II.

I have a little stash of canceled stamps. It includes two that celebrate the achievements of Edward Howard Armstrong, the inventor of FM, the regenerative receiver and the superheterodyne. After learning about Tim Healy's program I am tempted to look for a stamp album.

There are many radio and TV related stamps from around the world.

There's a seven page article on radio/TV stamps from around the world entitled "And Now, A Stamp from Our Sponsors" in the November, 2002 issue of *American Philatelist* magazine. I have the article here at my vintage radio/TV museum. Visit and take a look! Contact information is included at the end of this column. Always contact me for an appointment before coming.

(a) http://www.heharris.com
(b) http://home.earthlink.net/~russel06/rustamp
(c) Cover 2 of The Ivory Stamp Club album.

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EQUIPMENT RESTORATION

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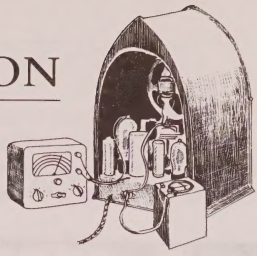


Alignment Problems and Some Interesting Sets

Our column this time features several contributions from John Kaetz (Bessemer, AL)—dko

I recently agreed to repair an RCA Model 84BT6 and build a power supply for it. This is a 6V farm set using a synchronous vibrator and tunes from 530 to 1720 kHz. The vibrator contacts were oxidized, but cleaned up nicely with carbide paper. After replacing the usual capacitors and one tube and aligning the set at 460 kHz, it performed well except for moderate tracking errors and a marked tendency to drift with temperature changes.

By applying heat to the oscillator area, I found that the oscillator coil was extremely heat sensitive. The circuit appeared to be conventional, using a 6A7 tube. Since there seemed to be a problem with the coil, I decided to wind a new one. The original was wound on a fiber tube ¾" in diameter.

I had a polystyrene form of the same size. Since the circuit had no padder for low end adjustment, I wound the tuned coil with 30 more turns than the coil chart called for to allow for LF adjustment. The tickler was wound over the cold end of the coil, as is usual, using about 15% of the secondary turns.

On installing the coil, the low end was perfect, but 1400 Khz came in at 1200 on the dial, and no amount of trimmer adjustment would move it even close. Looking at the original coil, I noticed that it was connected with the tickler at the "hot" end of the coil. I reconnected my coil accordingly and 530 now came in at 650. The high end was off the dial.

I removed turns from both windings and got the low and high ends of the band to track fairly well, but the middle was off. 1000 kHz came in at 940. I gave up and put the old coil back in—drift and all!

I believe that having the tickler wound on the "hot" end introduces a lot of fixed capacitance into the tuned circuit. This capacitance will vary with expansion and contraction of the coil as its temperature changes and affects the tuning. I wonder what would happen if a serviceman had to replace the original with a "universal replacement" coil. Why would RCA use such an off-the-wall design?

♦ ♦ ♦ ♦

I recently restored an Airline from the early 1930s, year and model unknown. After getting it "live" again, it had poor sensitivity and the BC only dial was way off. During alignment, I found that there were two IF stages with three IF transformers. All transformers were close-coupled. The first two had no trimmers and were apparently self-resonant. The third had a trimmer only on the output.

I tuned the signal generator around and found a broad IF response centered on 160 kHz for the first two IF transformers, but the third was too high and could not be tuned in with its trimmer. Since nothing could be done with the first two IFs, I added fixed capacitors to the third to tune it down to 160 kHz. At this point, overall gain was acceptable, but 600 kHz came in at 585 on the dial indicating that the IF frequency was probably intended to be 175 kHz.

The tuning capacitor had a smaller oscillator section than the RF, so there was no padder to calibrate the low end. I raised the inductance of the oscillator coil by inserting an old coil slug into it until 600 kHz came in at the correct place and then fastened the slug permanently in place.

There was a trimmer for adjusting the high end, so calibration at both ends of the band could be done although mid-range calibration was only fair. I assume that this arrangement was an attempt at "high fidelity" because the audio section and speaker were very good. Out of curiosity, does anyone know when makers began using the smaller oscillator section on the tuning capacitor?

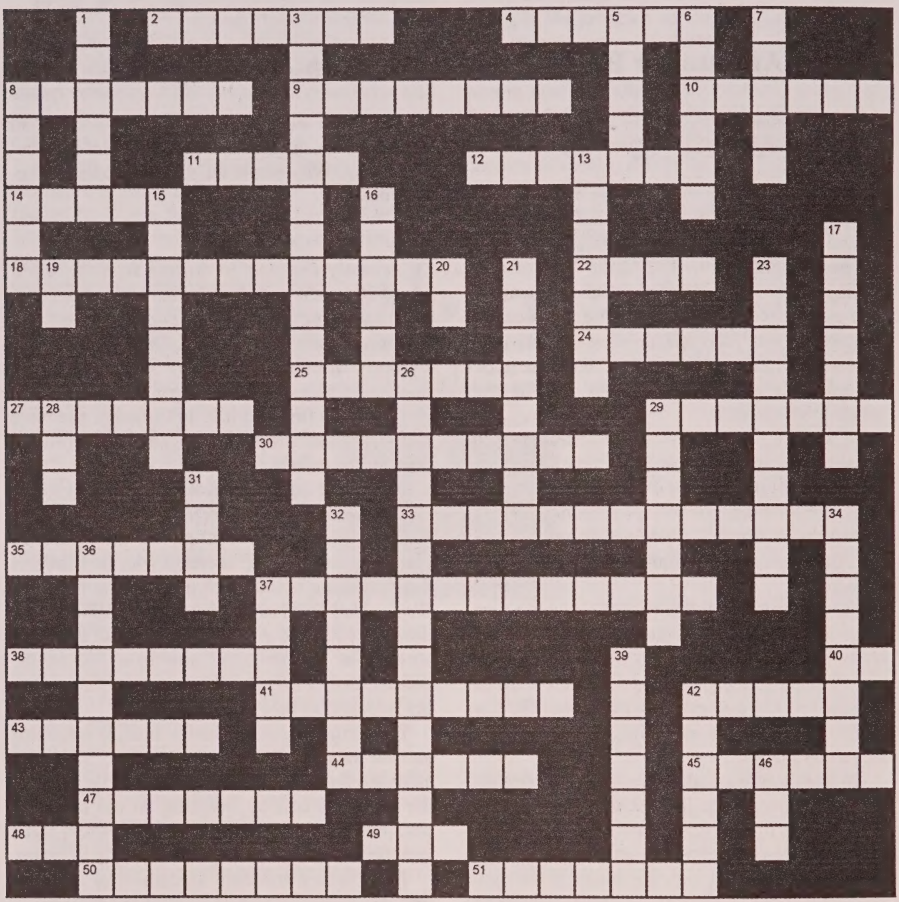
♦ ♦ ♦ ♦

Another set, interesting for its unusual features, was a 1938 Howard Model 525 console. It had 14 tubes including tuning

(continued on page 31)

BY DAVID W. KRAEUTER

CIRCUITS— SOME WORK, SOME DON'T



ACROSS

2. Hemophiliac.
4. Shunt or interstate route.
8. Barber's tool, too.
9. Leaders need at least one.
10. Continuously variable.
11. Found in the kitchen or the front end.
12. Do not confuse with cascade.
14. Broom act.
18. Good at making distinctions.
22. Die or nickname.
24. Look for this circuit in or around the hv cage.
25. Multivibrator type.
27. This bridge was named after a math expert.
29. Calculator function or circuit name.
30. This substrate contains all the parts.
33. Type of relaxation oscillator.
35. Power supply circuit or demolition aid.
37. This circuit used tubes twice and "backwards" (run together).

AUTHOR'S ADDRESS: 506 E. WHEELING ST., WASHINGTON, PA, 15301

38. Bistable multivibrator or foot wear (run together).
40. Low frequency amplifier circuit (abbrev.)
41. This early superhet variation is seldom seen.
42. Unpopular circuit or underwear part.
43. Bridge circuit named after a famous physicist.
44. "Double dipping" circuit.
45. Remember, all signal circuits must have one.
47. This circuit starts an action.
48. Short wave radio oscillator type (abbrev.)
49. Anti-blast circuit (abbrev.)
50. This early regen used a spider-web coil.
51. This filter circuit can eliminate hum.

DOWN

1. Interstate feature or measuring circuit.
3. Its output voltage is proportional to the rate of change of its input voltage.
5. Below 20 kHz, roughly.
6. This circuit mandates a certain form.
7. Educational or amplifier group.
8. Type of circuit or mind.
13. To connect two or more circuits in series.
15. The same voltage appears across every part in this circuit.
16. This circuit conditions the signal for the speaker.
17. Circuit essential to Armstrong's FM system.
19. Conjunction or amplifier type (abbrev.)
20. Some radios omit this amplifier (abbrev.)
21. Was Armstrong first with this circuit? (abbrev.)
23. Aka double-emitter follower.
26. U.S. tube configuration (run together).
28. Another anti-blast circuit (abbrev.)
29. Sometimes used when more volts are needed.
31. The person can't be helped, but the circuit can.
32. Sometimes used when different volts are needed.
34. Aka relay transmitter.
36. Type of wave generator.
37. Signal applied to a circuit.
39. First circuit seen by a transmitted signal.
42. All ammeters in this circuit read the same.
46. Circuit found in most three-dialers (abbrev.)

See Answer Key on Page 41.

EQUIPMENT RESTORATION, *continued from page 29*

eye, seven pushbuttons and tuned from 535 khz to 22 MHz in three bands. I got it for $10 at the 450 Mile Yard Sale which may be familiar to some members. The cabinet was in terrible shape, but it had P-P 6L6 output and a true 15" speaker—not a 12" on a 15" frame.

The variable tuning used a 6K8G oscillator-mixer, but the pushbutton tuning had its own 6A7 converter. The pushbuttons were tuned with mica trimmers of a book-like construction rather than the usual compression type. The books were interleaved with mica. The back of one book was fixed and the other moved in and out of it by a screw adjustment. The arrangement was similar to the solid-dielectric tuning capacitors on many transistor sets.

♦ ♦ ♦ ♦

About 5 years ago, I acquired a 1936 Westinghouse WR-315. It had ten metal tubes plus a 5Z3 rectifier and a tuning eye. It covered 530 kHz to 18 MHz in three bands. This set had dual conversion—a feature I have never seen on any other "home" set.

Following the RF amplifier, the signal was converted to 455 kHz with a 6A8, then coupled to another 6A8 where it was converted to 100 kHz. The frequency of the second 6A8 was controlled by a 6J7 reactance tube. Control voltage for the reactance tube was developed by a 6H6 discriminator fed from the 100 kHz IF signal amplified by a 6K7.

Why this elaborate dual conversion scheme was used at all is a mystery. A single stage of IF at 455 kHz would have given reasonable image rejection on SW for a "home" set. Maybe the conversion to 100 kHz gave better stability for the frequency control and variable bandwidth features used for better fidelity.

Another oddity was the use of an interstage transformer between the 6Q7 driver and the P-P 6L6 output. This transformer was open, and I replaced it with an A53C unit whose primary inductance is about 20 H. A tube like the 6Q7 needs a much higher inductance for good fidelity. Sound quality was acceptable, but you couldn't hear any difference between the broad and narrow IF settings, and the sound lacked "fullness".

Later I replaced the A53C with the solid-state P-P transistor circuit (*OTB*, V.44, #3, p.23) with a dramatic improvement in the sound quality.

BREADBOARDING

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Bring Historical Circuits to Life On Your Workbench!

Working With Crystal Control: A "Part 15" Broadcast Band Transmitter

The first continuous-wave sources of radio frequency power were AC generators; in 1907, a Swedish engineer named Ernst Alexanderson designed a large alternator that could generate 100 kHz at about 20,000 rpm. By 1911, DeForest's crude Audions were being used as amplifiers, and it's a safe bet that very soon after that, someone ran into the unwritten rule: if you want to design an oscillator, build an amplifier.

There's evidence that several inventors, Lee DeForest and a Russian named Popov among them, were observing tube oscillations and trying to understand them. But it was Edwin Armstrong who applied for the first patent for a vacuum tube oscillator in 1913 while he was still a college student. DeForest won a patent suit later, even though he apparently never fully understood the way his own tubes operated.

Armstrong's oscillators used coupled inductors in plate and grid circuits. By 1915 two more American inventors—W.E. Hartley and Edwin H. Colpitts—had patented variations in triode oscillators using single-inductor resonant tanks and capacitance coupling. Figure 1 shows simplified schematics of the three types of oscillators. It's easy to breadboard these simple circuits, but they all share one unpleasant characteristic. They drift around in frequency with supply voltage changes, parts temperatures, and maybe even the mood of the operator!

Testing Crystals

Researchers struggled with this problem for a couple of years. Then a professor at Wesleyan University named W.G. Cady, working with quartz crystals, stabilized an oscillator at a steady frequency related to the crystal's natural period of vibration. His papers, published from about 1920, establish Cady as the inventor of the crystal oscillator. Crystals for radio oscillators are easy to obtain these days. Let's breadboard a circuit or two.

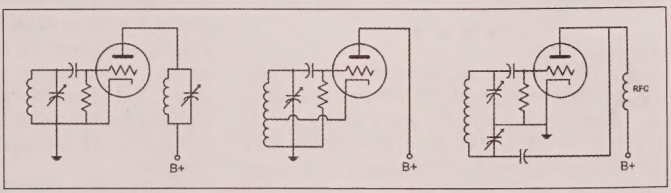


Fig. 1. Three basic triode oscillators. From left: Armstrong Tuned Plate-Tuned Grid, Hartley, Colpitts.

Figure 2 is a practical circuit made from junk box parts and can be powered by batteries. The tube is a filamentary triode. I used a type '31 and I built it with clip leads to grab the two terminals of the crystal so that I could test at different frequencies. The circuit goes into oscillation when the phase of feedback from the tank through the grid-plate capacitance is just right.

The tank circuit is made up of a plug-in coil (25 turns #28 [double cotton covered] on a 1¼ inch 4-pin coil form) and a 450 pF variable capacitor. With voltages applied, all you do is to move the tuning cap around to find the best oscillation point, watching the plate voltage on a 'scope. The coil in the picture works fine from about 1000 to 2300 kHz. if the crystal is any good.

Some crystals in my junk box just wouldn't start, and some were plenty active. So this makes a good tester if you have lots of surplus crystals of doubtful lineage. You can monitor the frequency on any nearby receiver; one with a digital tuner lets you measure the crystal accurately (or vice versa!)

Make a Transmitter

My neighborhood is infested with kids up to the age of fifteen or so—the age when I was getting into maximum trouble. Thinking to lead them astray in a different direction, I donated a couple of Hallicrafters S-38 sets to a pair of kids who live about 300 yards apart. I told them that, if they got interested, I would show them how to

make simple transmitters so they could talk to each other.

Figure 3 is the schematic of the transmitter—a crystal-controlled design using a 6BE6 modulated by a 6AK5 speech amplifier. It's basically a development of a standard phono oscillator circuit. I chose the RF parts to allow the transmitter to operate at 1690 kHz. The coil is the same one used in the breadboard test circuit; the capacitor is a 300 pF mica trimmer set at about 150 pF.

To avoid running afoul of FCC emission rules for unlicensed operation, as stated in Part 15 of Title 97 (1, 2), the output of this thing has to be limited. The input power to the final stage, the 6BE6, must not exceed 0.1 watt; the antenna can't be more than 3 meters in length.

Looking at the schematic, you'll see that the power supply is line-isolated. I used a Stancor P-6375 transformer rated at 6 volts, 2 amps to light the tube heaters and make 120 volts of B+. Any transformer with split 120-volt primaries can be used this way; you use one of the primaries as an isolated secondary, keeping the load power at half the transformer's rating to be safe.

The 6AK5 gives a voltage gain of almost 50, so that a crystal mic will give nearly 100% modulation of the carrier. There is about 10 volts of RF across the 1690 Kc crystal, and at the plate of the 6BE6 there can be as much as 100 volts of modulated carrier. You adjust the tank capacitor with the antenna plugged in.

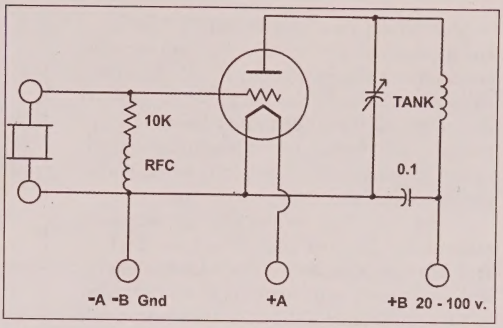


Fig. 2. Circuit of crystal test unit. See text for tank circuit values.

Shunt feed to the output tank keeps DC off the antenna. The resistor marked "R legal" is of a value that keeps the 6BE6 plate current starved enough to meet the 100-milliwatt power limit, and the 10-foot antenna lead is plenty long enough to get across the distance between the kids' houses. The antenna is made of three coat hangers soldered together with a banana plug at the feed end. The "key" is a pushbutton on the front panel.

I made the chassis for this from pieces of copperclad—my material of choice. When finished, I soldered in a bottom plate to keep curious fingers out.

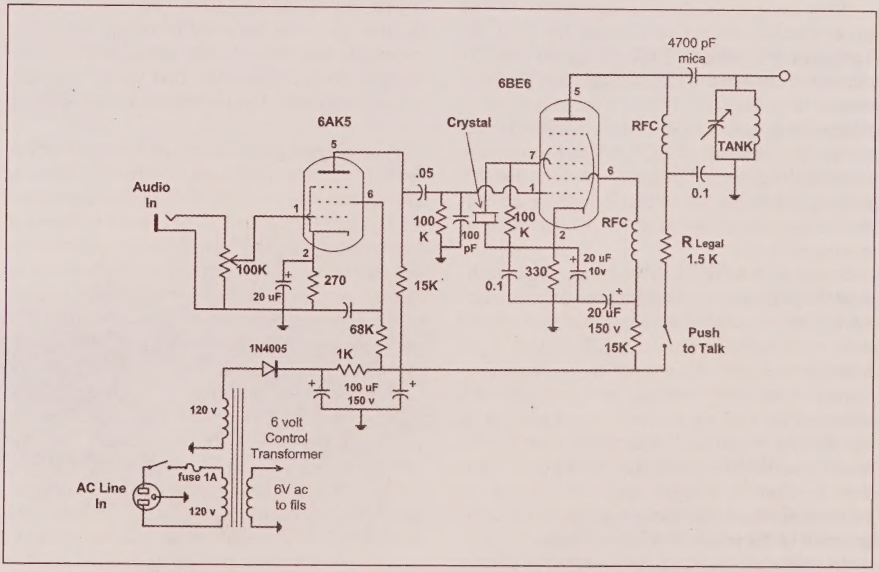
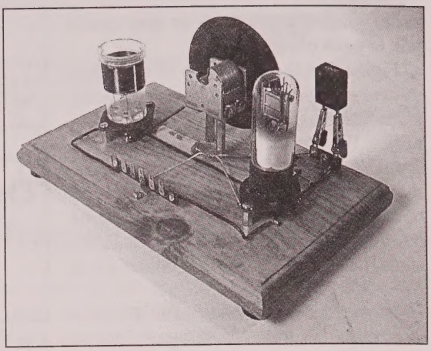


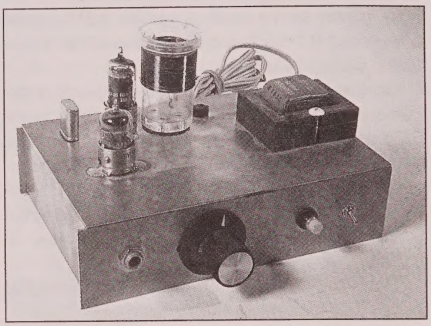
Fig. 3. Circuit of the broadcast band transmitter.

After I built this "breadboard," I fired it up into the ten-foot wire and drove around my palatial country estate in a golf cart with a portable radio to see how far the signal would carry. It was pretty much gone 600 yards down the hill to our main road. With a pair of good receiving antennas, the kids will be able to hear each other just fine across their 300-yard distance.

By the way, this circuit makes a nice little radio station for your home. Short out the key, feed in a tape of some old-time radio programs, and you can tune in the show on all the old radios in your collection (They do all work, don't they?).



The breadboarded crystal test unit.



The completed broadcast band transmitter. See text for tank circuit values.

References

(1) "Understanding Range Limitations for Low-Frequency Unlicensed Transmissions" by Tom Warnagris, *RF Design Magazine*, April, 1999

(2) FCC Part 15 Discussion, ARRL Web site; http://www.arrl.org/tis/info/part15.html# Technical

(3) *A Chronology of Communication Events Part 2: 1900 to Present* http://people.deas.harvard.edu/~jones/history/comm_chron2.html

Notes On Development of Crystal Control

After the Curies, the first application of the piezoelectric effect was made by Prof. P. Langevin in France in 1917. Langevin used X-cut plates of quartz to generate and detect sound waves in water. His object was to provide a means for detecting submarines and his work led to the development of SONAR and to the science of ultrasonics, the results of which are still making headlines (viz., the recent announcement of the successful use of ultrasonic imaging in mammography).

Langevin's work stimulated others to investigate the phenomenon of resonance in piezoelectric crystals. Among those who became interested were A.M. Nicholson of the Bell Telephone Laboratories and Prof. W.G. Cady at Wesleyan University. Both men, working with Rochelle salt, observed the reaction of the resonant piezoid on the driving circuit and both applied for patents based upon their observations. Subsequent litigation resulted in a legal decision in favor of Nicholson who is therefore considered to be the inventor of the piezoelectric oscillator.

In 1919 Cady used a quartz piezoid to control the frequency of an oscillator and in a series of papers during the next three years he described the use of quartz bars and plates as frequency standards and wave filters. It is generally accepted that Cady was the first to use a quartz piezoid to control the frequency of an oscillator circuit.

Both Nicholson and Cady used devices which would today be called monolithic resonators, having two sets of electrodes on the same crystal. It remained for Prof. G. W. Pierce of Harvard University to show, in 1923, that a quartz plate with only one set of electrodes could be made to control the frequency of an oscillator circuit using only one vacuum tube. Pierce's circuit has probably been used more than any other quartz crystal oscillator circuit.

In 1924 AT&T's station WEAF in New York City became the first in the United States to control its frequency with a quartz crystal unit *(Note: see p. 23 for an illustration of the WEAF transmitter and also p. 25 for a mention of crystal control at station KMMJ in the 1930s—ed.)* Within a few years all radio stations went to crystal control, thus providing another market for quartz crystal units.

TELEVISION

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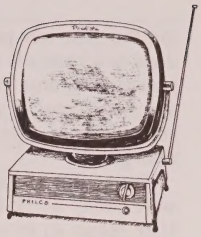
CUTCHOGUE, NY 11935 *PLEASE INCLUDE SASE FOR REPLY.*



Early TV "Set-Top Boxes"

By Mark Nelson (k8zhd@yahoo.com; http://www.tv-boxes.com)

In reviewing my latest copy of 'Antique Radio Classified' I noticed an ad by a collector of "TV boxes." It turns out that Mark Nelson has invented a new antique radio/television collecting subgroup! I found it quite fascinating to read about his research into the use of TV boosters and UHF converters at the beginning of the television age and to see how many of these items he has located. They are so much easier to store and display than TV receivers! And yet they have a genuine place in the early history of television.

When electronic television receivers first appeared on the market in 1938, RF tubes that could amplify signals at 50-megahertz and higher were not commercially available. That didn't much matter in those pre-war days, since you didn't buy a TV unless you were in the viewing area served by stations in certain large cities. But after World War II, the number of cities having television transmitters grew very rapidly and many more people demanded the opportunity to watch TV!

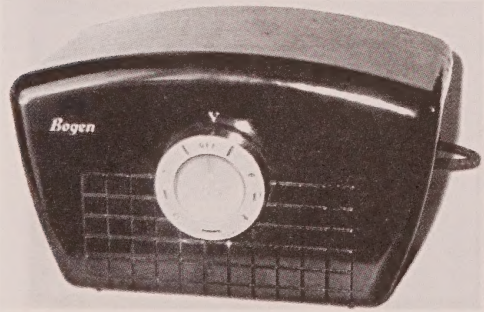
It became a challenge for would-be viewers to get reception in what became known as "fringe areas." Those pre-war sets needed RF amplifiers to receive the more distant signals, and fringe area set owners became an excellent market for "TV signal boosters." Of course, modern broadband boosters are still in use today.

UHF converters were a different story. The 12 channels originally available for TV broadcast were soon overloaded so the government made additional frequencies available in the UHF band. Thus the need for converter attachments to add these channels to the outmoded sets.

Here's some of the information Mark provided about his collection. Those who would like to contact Mark or view his excellent website will find the info above this box. —rb

Signal Boosters

A TV booster is a tuneable amplifier installed between the antenna and the TV set. Almost all had continuous tuning (rather than click-stop channel selectors) so you could peak up the signal just right. After 1953, the number of TV stations rose dramatically, so that by the mid to late 1950s, the vast majority of the U.S. population was within easy reception range of at least one TV station, and boosters lost popularity. All of the boosters in my collection are tube-type units. Most used one or two 6J6 dual triodes in a push-pull or cascode circuit or a 6AK5 low-noise tetrode. DC supply voltage was almost universally provided by a selenium rectifier.



Bogen bb1 Signal Booster has stylish cabinet, uses 2 6J6 tubes.

The challenge for the engineers was to come up with a circuit that increased the desired signal without adding noise of its own, and do it at a reasonable price. It seems that the styling of the cabinets was at best a secondary consideration; most of these boxes are pretty plain.

UHF Converters

The first commercial UHF TV station in the US, Portland Oregon's KPTV, received its license and went on the air in late 1952. The FCC had authorized the new TV channels (14 through 83) to relieve the crowding that occurred as commercial television broadcasters proliferated dur-

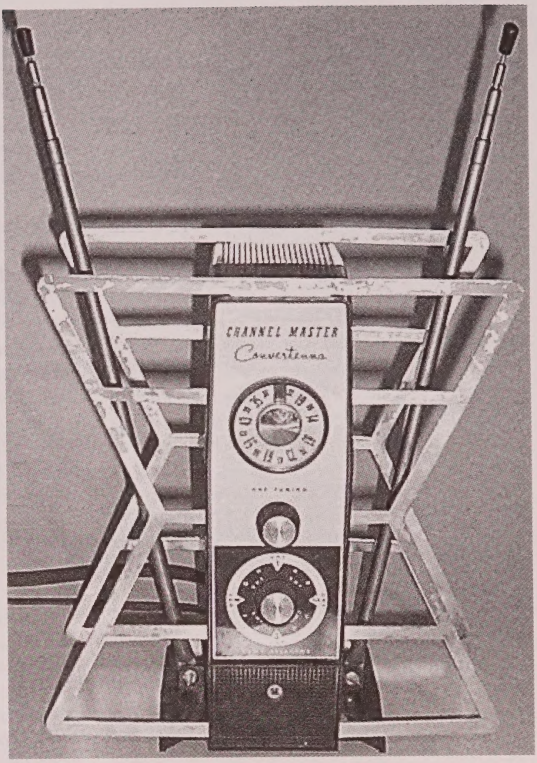
ing the post-war period. If any of these new channels were assigned in your viewing area, you would need to add a converter to your existing TV set (which, of course, tuned only 2 through 13).

Though the TV set manufacturers were pretty quick to make built-in UHF tuners an extra-cost option for their sets, it wasn't until 1964 that the FCC required UHF capability in all new TVs. And it wasn't until 1975 that they had to be as easy to use as the VHF tuners. Therefore the add-on converter boxes were in common use for many years.

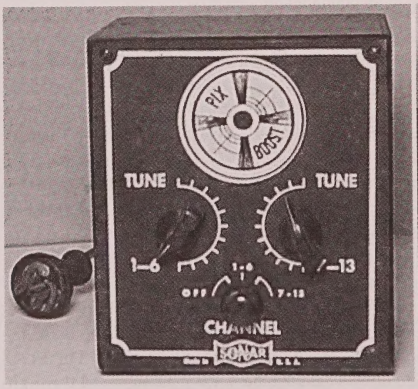
Most of the 50+ UHF converters in my collection are tube type, with a 6AF4 oscillator and a 1N82 (or similar) germanium diode mixer being the usual active components, along with a selenium rectifier for DC power. Fancier models included an output (IF) amplifier tube. By the 1960s, solid-state (transistor and tunnel diode) models were available.

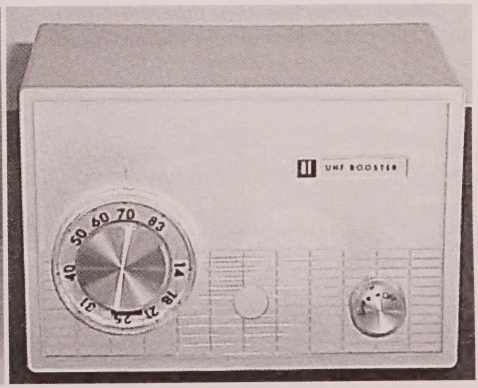
All are continuous tuning (no click stops) and convert the UHF channels to enter the TV set at VHF channel 5 or 6. RF preamplifier stages are almost unknown in these (and present day) UHF converters. The only tubes initially available that would amplify the 400 to 900 MHz signals were either too noisy to improve the picture or too expensive.

UHF converter manufacturers, coming along when TV technology was pretty well established, had more time and resources to spend on styling. While none of the converters I've seen are anywhere near as stylish as radios of the '30s, they hold their own in the diminished design environment of '50s and '60s television.



The Channel Master Convertenna combines a converter with a set of rabbit ears, is one of my favorites.





Left: Sonar "Pix Boost" from Column Editor Dick Brewster's collection. Right: This Blonder-Tongue UTB-1 is a rare UHF booster.

BY F. J. LOTITO K3DZ

A MID-1930s STYLE "TRF-REGEN" THREE-TUBE RECEIVER

Are you bored with your "no human intervention required" modern receiver with its computer controlled RS232 interface, dual digital synthesized VFOs, digital signal processor, narrow-as-a-double-edged-razor band-pass filter, "kazillion" dB dynamic range, etc.? Do you have idle hands while listening to this "state-of-the-art" receiver? You do have a choice of things to do to liven up your receiving interests and keep your idle hands busy.

You can nibble salt-free, no-cholesterol potato chips (ugh), start smoking again, or try a real two-handed TRF-Regenerative type receiver from the "Golden Era Of Radio." It's amazing how you can keep the adrenalin flowing and both hands busy with a classical TRF-Regen receiver! There are a bunch of knobs to twiddle, and at times you wish had as many hands! I built a TRF-Regen out of non-critical common junk box parts, am having a ball with it, and I still have time to munch on snacks between knob twiddles!

My set is based on the 3-tube receiver designs appearing in the *ARRL Handbook*, 1936 edition, pages 103 through 106. Tabulated below are tube line-ups for the original design's 2-, 2.5- and 6.3-volt glass and metal tubes, other possible vintage tube alternates, and my set's tubes. Figure 1 is a duplicate of the original schematic for the 2.5 volt version. See the 1936 *Handbook* for schematics of the 2-volt and 6.3-volt metal tube versions. My receiver is based on the 2.5-volt design except for tube complement, filament voltage, and my use of a dual-triode audio amplifier stage.

No antique vintage parts are used in my version of this classic. I used only inexpensive, easy-to-find, WWII and later components. A few changes were made to accommodate the contents of my junk box and my intended use for the receiver.

The Chassis. The basic chassis is a 10¼" by 5⅞" by 3¾" high U-chassis, which started life as a Tektronix Type 162 Waveform Generator. It is small by mid-1930 standards. I definitely would use a chassis with a larger top deck if I were to include an on-board power supply.

Means of tuning the TRF and Regen Detector. The TRF stage and regen detector are not ganged, but tuned separately. Tuning range was restricted to the CW segments of the 40-, 80- and 160-meter amateur bands. A gear reduction drive from a WWII surplus tuning unit drives the regen detector's bandspread tuning capacitor. I did not consider bandspread tuning necessary for the TRF stage. This approach simplified the mechanics and parts selection.

Audio stage design. Figure 2 shows the circuit of the dual triode audio output stage I substituted for the original type 56. A single-pentode type audio output transformer of unknown electrical characteristics was used to keep B+ off the earphones and to allow for the use of a "modern" lower impedance headset.

Power supply. The power supply is on a separate chassis. I have been building separate power supplies so I can use them for other projects. Thus, I avoid unnecessary duplication of power

Function	2-Volt	2.5 Volt	6.3 Volt	6.3 Volt/Alt*	Metal Tube	My Receiver
TRF Amp	34	58	78	6D6/6U7	6K7	6BA6 (12BA6)
Regen Detector	32	58	78	6D6/6U7	6J7	6AU6 (12AU6)
Audio Amp	30	56	37/76	76/6P5	6F6	12AU7

**After the slant bar are alternates cited in the RCA#* RC-14 Receiving Tube Manual, *1940 printing.*

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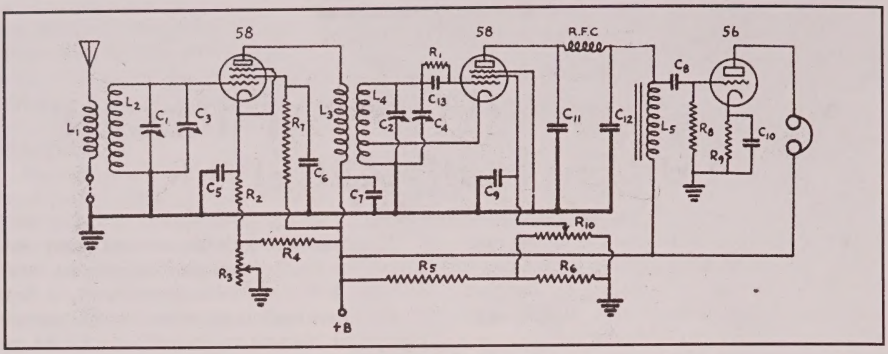


Fig. 1. Schematic of trf-regen receiver from 1936 ARRL Handbook, *page 104.*

supplies.

I used an old transformer-operated "battery eliminator" that provided 6.3 VAC for the tube filaments and full-wave rectified and filtered DC for the plate B+ supply. The B+ filter is a low-pass brute-force π-type RC filter. Additional series input and output resistors were added to drop the voltage to the 200-VDC value recommended in the receiver's original design. Two 0C3s in series were used to stabilize the 200 volts. The VR tube current at no load is 30 mA.

By trial and error it was found that the B+ for the 6BA6 and 6AU6 needed to be only 48 volts. This was derived from the 200 VDC source through a series bleeder resistor and four Radio Shack one watt 12 volt zener diodes in series aiding. (The purist can make believe the four zeners are a low voltage "neon" bulb or 45 volt B battery.) The regenerative detector's screen grid pot (regeneration control) is 25 KΩ and connected across the first 24 volts of the 48-volt supply.

Chassis layout. The interstage shield cans above the chassis, as well as the shield plates between the stages under the chassis, were made from 0.018"-thick painted aluminum sheet (house siding). The paint was removed at contact and overlap areas. The top and bottom U-chassis cover plates and a new front panel (mounted over the original Tektronix front panel) were made from 1/32"-thick unpainted aluminum sheet stock.

Coil information. Coil forms are the traditional 4- and 5-pin phenolic plug-ins. All were used hamfest finds. No problem there; they cleaned up fine and their already-drilled holes presented no problem. The 1936 *Handbook's* coil-winding data are shown below. L1/L2 are wound on the same form, as are L3/L4. Spacing between coils on each form is about 1/8". Turns for taps are counted up from ground end.

BAND	L1	L2	L3	L4	Tap At Turn #
160 meters	10	55*	30	55*	3
80	6	28	20	28	1
40	5	11***	9	11***	½**
20	3	5	5	5	¼

* For 160 meters only, I removed 15 turns off L2 and L4 to use a higher tuning capacitance
** For 40 meters only, I changed the tap to ¾ turn
*** For 40 meters only, I installed a 50 pF silver mica across L2, and a 39 pF silver mica across L4

I used the following coil forms —which happened to be the closest-to-spec ones I found in my junk box:

Inductor	Band	Coil Form Diameter	Number Of Pins
L1/L2	160	1½"	4
L3/L4	160	1¾"	5
L1/L2	80	1½"	4
L3/L4	80	1⅝"	5
L1/L2	40	1½"	4
L3/L4	40	1½"	5

Though the original 1936 article specified various sizes and types of coil wire, I wound all coils with salvaged enameled magnet wire — approximately #22 for the coils proper and #20 for the links.

See pages 104 and 106 in the '36 *Handbook* for additional information on the coils. Component values and most coil windings are identical to the 1936 *Handbook* article (see page 104). The original author mentioned that a "little parts and coil trimming might be necessary." Yes indeed, but it was minor, see the text.

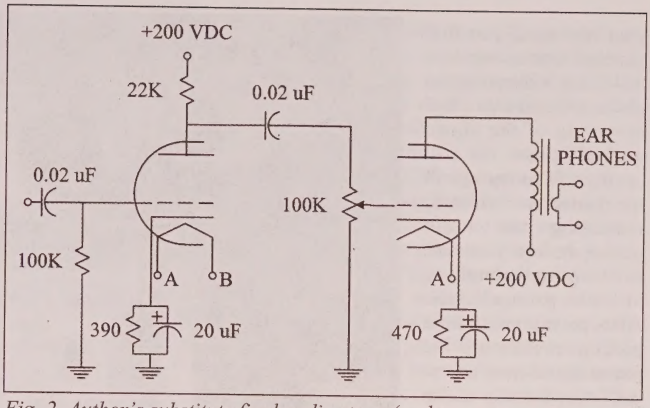


Fig. 2. Author's substitute final audio stage (replaces stage using type 56 in original schematic). Tube is a 12AU7; filament voltage (at points A-B) is 6.3 Vac.

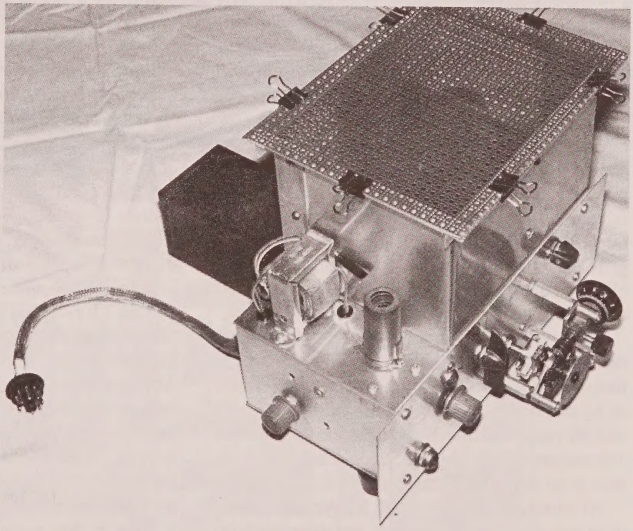
Use of "Modern" Components. The 1936 *Handbook* opened the door to use of the new "octal" tubes. That's my justification to further open the door with my post-WWII tube lineup as noted above, and the lowered power supply voltage to the receiver's first two stages as noted below.

Most definitely, the use of "modern tubes and components" did nothing to improve my receiver except for improving the reliability of its individual components. My receiver is still a pre-WWII TRF-Regen!

The Plate Audio Choke. Regen detectors use monstrously large high-inductance (by modern standards) plate audio chokes. This one is a real "boat anchor," a metal-can-enclosed dual 20H DC power supply choke with both sections in series aiding. It was lifted from a hamfest "take me home for 25 cents" military power supply with PCB (no doubt) oil filled capacitors.

I was going to use a microwave oven power supply transformer for the audio choke before I unearthed the military power supply from a dark corner of my basement. Microwave oven transformers have a surprising amount of secondary winding inductance.

You may want to try a trick that will allow use of a moderate inductance value for the audio choke. At your favorite audio frequency, resonate the choke with a parallel capacitor. Resonance will raise the choke's apparent impedance, thus raising the receiver's audio gain. Resonance will be broad because of the choke (or transformer's) inherent low Q. There's no reason why you can not mount the choke, and audio output transformer if you elect to use one, on the side of

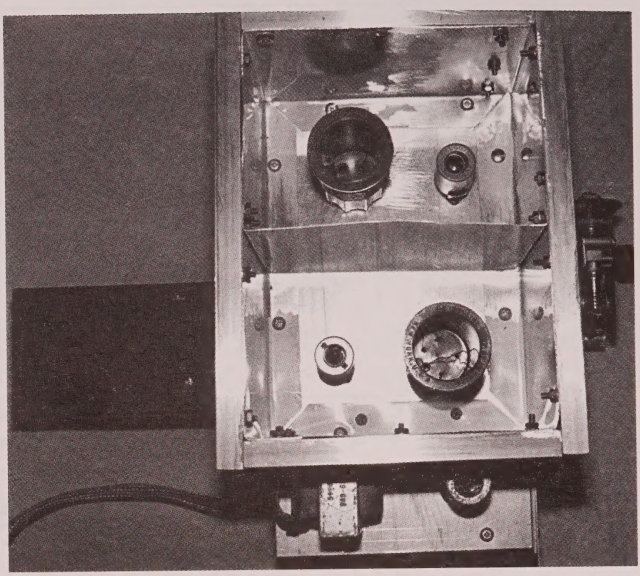


The completed TRF-Regen receiver.

your chassis if you find yourself short on top deck real estate. Resonating the choke and rear side panel mounting of the choke worked for me!

Be sure to lay out all the chassis mounted parts, including the audio choke, before you start drilling and punching holes in your chassis. Also, to minimize hum pickup, make sure the power transformer is kept well away from the choke and tubes.

You may luck out and have a vintage, receiver-type high-inductance audio choke that is not open or shorted. These are generally compact in size compared to "power supply" type chokes. If you have such a choke and plan to use it, leave ample room on your chassis just in case that choke bites the dust. You may have to shoe-horn in a boat anchor choke as I did.



A look under the perforated aluminum top cover, showing internal shielding.

Shielding Issues. Make sure you shield the coil/tube compartment well, including under the chassis, and rig up a TR-switch outside the PL-259 chassis-mounted coax antenna feed line connector. Otherwise when you transmit, you will not be able to use the receiver as a side-tone monitor. Poor shielding will cause the receiver to block or cause your headphones to blow out your eardrums!

On top of the coil/tube compartments, I installed a lip made from ½ by ½ by 1/16 thick aluminum angle. Over the top of the lip I placed a cover made from common building-supply-center perforated light gauge unpainted aluminum grill. A bunch of small metal clamp-type paper clips secure the perf sheet to the ½" lip. Coil changeout requires no tools with this approach.

Operation and Performance. As expected, this receiver has plenty of gain. Only a 6- to 10-foot length of hookup wire, draped in the shack as an inverted-L, is required for easy copy on 40 and 80 meters! Most of the time the antenna for 160 meters is only about 15 feet of hookup wire, also in an inverted-L configuration.

At times, in the evening, I have no trouble copying 40-meter European amateur stations with the short antenna. Not bad for a semi-raised ranch basement shack! (There may be some truth to the underground antenna stories I've heard OTs talk about.)

Using my normal antenna system, the receiver frequently overloads when listening to northeast, neighboring midwest, and mid-atlantic call area stations, even with the RF gain all the way down. S-m-o-o-t-h regen start-up is realized on all 3 bands. There do not appear to be any "blank" segments where the signal is sucked out due to antenna/RF amplifier tuning.

Power supply hum is amazingly low, probably due to the use of indirect-heated tubes (tubes with cathodes). Don't forget to use a filtered DC filament supply to minimize hum modulation if you opt for the vintage, direct-heated tube lineup. If you use indirect-heated tubes and an AC filament supply, make sure to test your tubes for heater-to-cathode shorts, or excessive heater-to-cathode leakage.

This TRF-Regen has all the traditional limitations and quirks of the period receiver. It drifts a little even after warm up, and overloads easily. At times selectivity times seems to be sharp as a tack, at other times broad as a barn door! TRF tuning slightly pulls the regen detector's frequency. If the regen control is advanced too far, the receiver squeals like a greased pig at a country farm fair!

You'll have no problem keeping both hands busy with this receiver. Its performance must be

PARTS LIST, TRF-REGEN RECEIVER
From the 1936 Edition, ARRL Handbook, *page 104*

ITEM	DESCRIPTION
C1, C2	35 pF variable
C3, C4	100 pF variable
C5-C8	0.01 µF mica
C9, C10	01 µF paper
C11, C12	100 pF mica
L5	audio choke (see text)
R1	5 megohm
R2	250 ohm, 2 watt
R3	10,000 ohm tapered wire wound pot
R4	50,000 ohm, 2 watt
R5	14,000 ohm, wire wound, 5 watt
R6	5,000 ohm, wire wound, 5 watt
R7	100,000 ohm, 1 watt
R8	1 megohm
R9	2,000 ohm, 1 watt
R10	50,000 ohm pot
RFC	1 millihenry RF choke

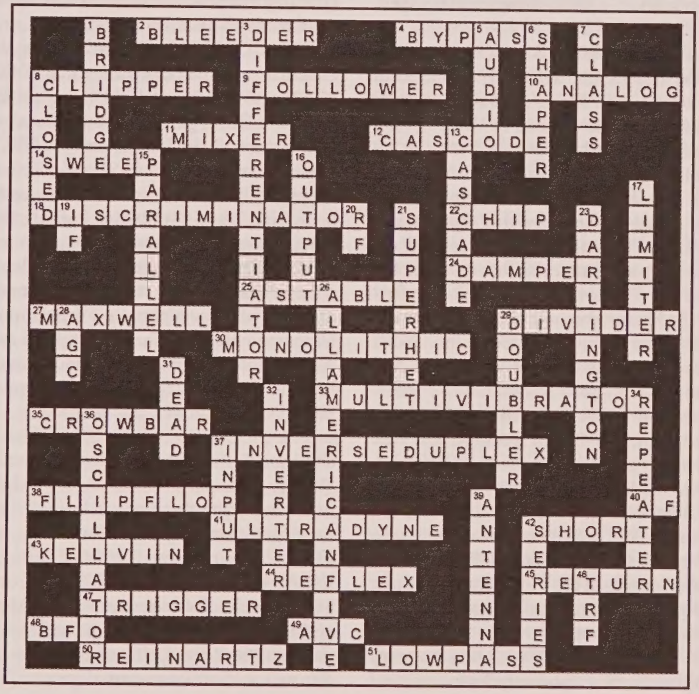
frequently re-optimized for changing band conditions. Human intervention with copious adrenaline flow is the order of the day. So far BCI has not been a problem on 40 or 160 meters—so long as I tune the TRF stage.

I learned that there is a fair amount of summertime life on the CW segments of 80 meters. In the summer try this band an hour or two before sundown and just before and immediately after sun-up. This is a good time to practice using a vintage receiver. Practicing during the heat of an OT contest is the wrong thing to do, HI!

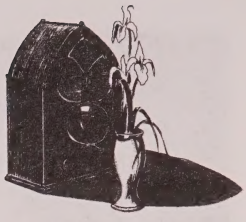
Have fun OM, and if you have a companion OT transmitter to go along with your TRF-Regen, forget RST, use the Q-codes QSA and QRK. Oh yes, do not get caught between kilowatt stations spaced less than 15 kHz apart, HI!

NOTE: The author will send a copy of the 1936 Handbook *construction article for this receiver to any interested reader who sends a #10 SASE.*

CROSSWORD ANSWER KEY *—From "Circuits" Crossword, page 31*



RECENT RADIO, TV AND ENTERTAINER OBITUARIES



COMPILED BY **CHARLES S. GRIFFEN W1GYR**
1225 NEW BRITAIN AVE., WEST HARTFORD, CT 06110-2405

Note: When known, the date of death is indicated in parenthesis.

ISRAEL H. ASPER, 71, (10-7-03) media executive. Asper was the founder of CanWest Global Communications Corp. which owns Canada's Global Television Network, more than 60 newspapers including *The National Post*, and radio stations and networks in Australia, New Zealand, Ireland and the United Kingdom. In January of this year he relinquished his position as Executive Chairman of CanWest, but remained as Chairman of the Board of Directors. Asper began building his media group in 1975 when he and three partners purchased KCND (TV) in Pembina, ND and moved it to Winnipeg under the call letters CKND. Glenn O'Farrell, President of the Canadian Association of Broadcasters, and former CanWest employee, said, "He was a global leader in terms of his business vision, his remarkable philanthropy and his view of Canada in the World."

CHARLES BRONSON, 81, (8-30-03) actor. Bronson was known internationally as the ideal American tough guy. He is probably best remembered for his roles in some of Hollywood's most violent films such as *Death Wish* (1974) and its sequels. Some of Bronson's later films are *Hard Times, Breakout, St. Ives, From Noon Till Three, Death Hunt, Love and Bullets* and *Murphy's Law*. His acting career was well established in Italy and France before it was in the United States. However, Bronson's performances in the French-made thriller, *Rider on the Rain* (1969), convinced Hollywood film makers that he possessed artistic skill. He was a cast member on the television shows *Empire* (NBC 1963), *Man with a Camera* (ABC 1958-1960), *The Travels of Jaimie McPheeters* (ABC 1963-1964) and made guest appearances on *Treasury Men in Action* (ABC/NBC) and *The Sheriff of Cochise* (Syndicated). After serving with the Army during WWII he worked at various jobs until he went to California in 1949 and began taking acting lessons at the Pasadena Playhouse. In 1951 he got a minor role in *You're in the Navy Now* starring Gary Cooper.

JOHNNY CASH, 71, (9-12-03) country music singer. Cash's "gravelly bass-baritone voice was the vocal bedrock of American country music for more than four decades." During 1956 he recorded *I Walk the Line*, which became his biggest hit and signature song, and was invited to join the Grand Ole Opry. Other hits include *There You Go, Don't Take Your Guns to Town, Ring of Fire, Sunday Morning Coming Down* and *Flesh and Blood*. He was a guest on many TV programs including *The Jimmy Dean Show* (CBS 1957) and *The Kraft Music Hall* (NBC), *Command Performance: The Stars Salute the President* (1981) and *Dr. Quinn, Medicine Woman* (ABC 1993-1994.) He hosted *The Johnny Cash Show* (ABC 1969-1971, CBS 1976) and *Johnny Cash Presents the Everly Brothers* (ABC 1970). Some of Cash's film credits include *Door-to-Door Maniac* (1961), *Night Rider* (1962), *The Gospel Road* (1973) and *All My Friends Are Cowboys* (1998). He won 11 Grammy Awards and in 1980 was inducted into the Country Music Hall of Fame.

KEN COLEMAN, 78, (8-21-03) sportscaster. Coleman was the broadcast voice of the Boston Red Sox from 1966 to 1974 and again from 1979 to 1989. He began his professional career in Cleveland with the Indians and the NFL's Cleveland Browns between 1952 and 1965. Coleman moved to Boston in 1966 where he and his partners, Ned Martin and Mel Parnell, worked in three-inning shifts between the radio and television booths. He left the Red Sox after the 1974 season, when another station took over the broadcasting rights, accepting a TV position with the Cincinnati Reds. Coleman returned to the Red Sox broadcast booth in 1979 and remained there until his retirement in 1989. He was inducted into the Red Sox Hall of Fame in 2000.

JINX FALKENBURG, 84, (8-27-03) actress and model. Falkenburg, a fashion model during WWII, joined her husband, Tex McCrary, to host one of the three major husband-wife radio breakfast shows in New York City during the 1940s. Their show, *Tex and Jinx*, aired on WEAF (later WNBC and WRCA) from 1946 to 1959. Unlike some programmers, McCrary respected the intelligence of the early morning audience. The show dealt with serious issues of the day and included substantial guests. Falkenburg

was also a panelist on *Leave it to the Girls* (Mutual 1945-1949). *Tex and Jinx* was seen by TV viewers on NBC in 1947 and on CBS in 1949. Their other TV credits include *At Home with Tex and Jinx, The Tex and Jinx Film* and *Preview with Tex and Jinx*. Some of Falkenburg's movie credits include *Sing for Your Supper, Laugh Your Blues Away* and *Cover Girl*.

BUDDY HACKETT, 78, (6-30-03) comedian. Hackett performed in nightclubs, movies and television, and became a "comedic godfather" to the younger generation of entertainers. He began his career on the "borscht circuit" in New York's Catskill Mountains, and by the late 1940s was appearing in cabarets and small clubs in New York City. Hackett later went on to perform regularly in Las Vegas at the Sahara Hotel, El Rancho and Caesar's Palace. In 1954 he made his Broadway debut in *Lunatics and Lovers* which was followed by film appearances in *All Hands on Deck, God's Little Acre, The Music Man* and *It's a Mad, Mad, Mad, Mad World*. Some of his TV credits include *School House* (Dumont 1949), *Stanley* (NBC 1956-1957), in which he co-starred with Carol Burnett, *The Jackie Gleason Show* (CBS 1958-1959), *Max Liebman Presents* (NBC), and *The Jack Paar Show* (NBC 1958-1962).

GORDON JUMP, 71, (9-22-03) actor. Jump played Arthur Carlson the radio station manager on the TV sitcom *WKRP in Cincinnati* (CBS 1978-1982) and appeared in Maytag commercials as "Ol' Lonely" the repairman (1989-2003). He later returned for a revival of the sitcom, *The New WKRP in Cincinnati* (syndicated 1991-1993). During the early 1960s he made television appearances on *The Brady Bunch* (ABC), *Daniel Boone* (CBS), *Get Smart* (NBC) and *The Partridge Family* (ABC). Some of Jump's film credits include *Conquest of the Planet of the Apes* (1972) and as a fellow doctor of Walter Matthau's in *House Calls* (1978). Jump began his career working for small radio and television stations hosting children's shows, delivering weather reports, writing and producing.

BERNARD H. KAMENSKE, 75, (9-25-03) news specialist. Kamenske was Chief of the *Voice of America's* news operation from 1973 until he resigned in 1981. He left the agency when the Reagan administration proposed to make it a more partisan supporter of United States policies. In 1976 the news operation had obtained a Congressional charter guaranteeing its accuracy and objectivity. After leaving the *Voice of America*, Kamenske served as CNN's Senior News Editor in Washington until 1983. Kamenske began his career in Boston with the Associated Press in 1944, serving as a writer and editor. In 1955, he joined the Voice of America as a news writer.

TEX McCRARY, 92, (7-29-03) journalist and publicist. McCrary helped create the talk-show format on radio and television. He and his wife, Jinx Falkenburg, hosted *Hi Jinx* on WEAF in New York City from 1946-1959. (For additional information about their radio and TV programs please see JINX FALKENBURG's entry above.) McCrary, who was gifted at shaping public opinion, was convinced that General Dwight D. Eisenhower could be persuaded to run for President and staged a huge rally at Madison Square Garden on February 8, 1952. A few weeks later, Eisenhower entered the New Hampshire primary and was on his way to the White House. In 1959 he produced the *Typical American House* exhibit at the United States Exhibition in Moscow, where the famous debate on capitalism took place between Vice President Richard M. Nixon and General Secretary Nikita S. Khrushchev. McCrary began his career as a copy boy at *The New York World-Telegram*, but later joined the *New York Daily Mirror* where he became Chief Editorial Writer. He also provided public relations services to many important corporate and government clients.

GISELE MacKENZIE, 76, (9-5-03) singer and actress. Mackenzie, known as "Canada's First Lady of Song," gained fame in this country on the weekly radio program *Your Hit Parade* (NBC 1950s) and the television version on NBC from 1953-1957. Each week she and the other vocalists would perform the seven most popular songs in America. Her other radio credits include *Club Fifteen* (CBS 1947-1953) and *The Mario Lanza Show* (CBS 1951, NBC 1951). MacKenzie was seen on TV as the summer host of *The Chevy Show* (NBC 1956), *The Gisele Mackenzie Show* (NBC 1957-1958), *Kraft Television Theatre* (1955) and *The Sid Caesar Show* (ABC 1963-1964). After WWII she performed with the Robert Shuttleworth Band as a violinist, pianist and vocalist. In the late 1940s MacKenzie's radio show, *Meet Gisele* was heard on the Canadian Broadcasting Company.

HERBIE MANN, 73, (7-1-03) jazz flutist. Mann "helped to popularize the flute as a jazz instrument and to introduce the music of other cultures into the mainstream of American Jazz." He began performing with a band in the early 1950s while stationed in Trieste, Italy with the U.S. Army. After his discharge, Mann worked with the Dutch jazz accordionist Matt Mathews and the arranger Pete Rugolo, before becoming a freelance soloist. In 1959 he formed the *Afro-*

Jazz Sextet. During the 1960s the group toured Africa under the auspices of the State Department, later going on to Japan, Europe and Latin America. Mann released his first album, *Common Ground*, in 1960 and two years later his live album *Herbie Mann at the Village Gate* sold over 500,000 copies.

GROVER MITCHELL, 73, (8-6-03) jazz trombonist. Grover was the lead trombonist for the late-period *Count Basie Orchestra* and the third leader of the group since Basie's death in 1984. He joined Basie's band in 1962 and remained there until 1970, when better paying jobs were available in television. Mitchell joined NBC and worked on the *Flip Wilson Show*, remaining with the network for ten years. He also appeared in films such as *Lady Sings the Blues*. Mitchell rejoined Basie in 1980, but continued to lead his own band which he began in 1978. In 1995 he became bandleader of the *Count Basie Orchestra*. Earlier in his career he played with the King Kolax, Lionel Hampton and Duke Ellington Bands.

ROY NEAL, K6DUE, 82, (8-15-03) news science journalist. During his 38 year career with NBC, Neal worked as a correspondent, producer and aerospace expert. He provided the network's TV coverage of the American space program from a 30-year period that included the initial shuttle flights. Neal also played an important role in convincing NASA to permit amateur radio on board human space flight vehicles. He Chaired the Space Amateur Radio Experiment (SAREX) on the International Space Station. Neal served in WWII and upon discharge resumed his broadcasting career in Philadelphia. He joined NBC in 1948 and later relocated to California. There he set up the network's West Coast News Bureau and also served for three years as Science Editor. He reported on political conventions from 1960 to 1972, retiring from NBC in 1986.

DONALD O'CONNOR, 78, (9-27-03) dancer, singer and actor. O'Connor's comedy and acrobatic "Make 'Em Laugh" solo in *Singin' in the Rain* made it a film classic. Other musicals he appeared in include *Call Me Madam, Anything Goes* and *There's No Business Like Show Business*. O'Connor also appeared in *Francis* (the talking mule) in 1950 which proved so popular it was followed by five other films. He was heard on a number of radio programs, including *The Ginny Simms Show* (CBS 1947), *The Philip Morris Playhouse* (CBS 1948-1949) and episodes of *Suspense* (CBS). His television credits include *The Colgate Comedy Hour* (NBC 1951-1954), *The Donald O'Connor Texaco Show* (NBC 1954-1955) and *The Tonight Show* (NBC 1962). O'Connor's parents were circus performers. After his father's death the children joined the act. By the time he was three he was singing and dancing regularly in vaudeville.

DANA M. RAYMOND, 89, (8-3-03) patent attorney. Raymond won or achieved settlements in 21 lawsuits filed by Major Edwin Howard Armstrong against companies that had denied him credit or compensation. Armstrong was the inventor of the regenerative detector, the superregenerative detector, the superheterodyne receiver, frequency shift keying and frequency modulation. Other companies, such as General Electric and Westinghouse, had agreed earlier to pay Armstrong royalties for the use of his inventions. This fact and Raymond's shrewd legal strategy and scientific knowledge helped him win settlements. He was the Secretary of the Armstrong Memorial Research Foundation at Columbia University and was a Fellow of the American College of Trial Lawyers.

JOHN RITTER, 54, (9-11-03) actor. Ritter was the star of the television show, *8 Simple Rules for Dating My Teenage Daughter* (ABC). This sitcom was the cornerstone of the network's efforts to revive its ratings. The TV shows in which he was a cast member include *The Waltons* (CBS 1972-1977), *Three's Company* (CBS 1977-1984) and *Hooperman* (ABC). Ritter also made guest appearances on *Thicke of the Night* (syndicated). In 1984 he received the Emmy Award for his role of Jack Tripper on *Three's Company*. Ritter also performed in television movies, including Stephen King's mini-series *It*, and such feature films as *Sling Blade* (1996), *Tadpole* (2002) and the forthcoming *Manhood*. He was the son of country music star Tex Ritter.

REX ROBBINS, 68, (9-23-03) actor. Robbins performed on stage, in movies and in more than 300 commercials. He appeared in 18 Broadway plays from 1963 to 2000, but is probably best remembered for his role as Herbie opposite Angela Lansbury in the 1973 production of *Gypsy*. Some of his other stage credits include *One Flew Over the Cuckoo's Nest* (1963), *Comedians* (1979), *Sisters Rosenzweig* (1993) and James Joyce's *The Dead* (2000). Robbins film credits include *1776, The Royal Tenenbaums* and the original *Shaft*. He was a cast member of the TV program *Nurse* (CBS 1981-1982) and co-starred with Angela Lansbury on an episode of *Murder, She Wrote* (CBS 1984).

ROD RODDY, 66, (10-27-03) announcer. Roddy was Bob Barker's sidekick announcer for the popular television game show *The Price is*

(continued on page 46)

NEW BOOKS AND LITERATURE

DAVID W. KRAEUTER, 506 E. WHEELING ST., WASHINGTON, PA 15301 E-MAIL KRAEUTER@EARTHLINK.NET
PLEASE INCLUDE SASE FOR REPLY.

Books to be reviewed in this column should be sent directly to David Kraeuter at the address above. After review, all such books become a permanent part of The AWA Library, which is part of The AWA Electronic Communication Museum and is available to members for browsing and research.

Signor Marconi's Magic Box:
The Most Remarkable Invention of the 19th Century and the Amateur Inventor Whose Genius Sparked a Revolution
By Gavin Weightman. Published 2003 by Da Capo Press, 617-252-5200, www.dacapopress.com, 5½ x 8¼ inches, 312 pages, hardcover, $25.00.

"Once upon a time in a land far, far away…" So might Weightman's book have begun, for it is nothing less than a storybook—but for adults. There are no end notes or bibliography and very few footnotes; all these scholarly trappings would have gotten in the way of the stories Weightman wants to tell. It is nevertheless obvious from the text that Weightman read widely and deeply about his subjects before starting his narrative.

Weightman's cast of supporting characters is extensive and helps the reader see Marconi in cultural and historical perspective. So we have the story of Maskelyne brashly but correctly demonstrating that Marconi's wireless communication system was not as private as he liked to say it was. "Crazy" deaf Heaviside makes a brief appearance in the narrative, and two chapters are devoted to Jack Phillips and Harold Bride, and Harold Cottam, who were radio operators on the *Titanic* and *Carpathia*, respectively.

Weightman's telling of the story of Marconi's meeting with Bride and Cottam after the *Titanic's* disaster is nothing short of poignant. (Phillips did not survive the disaster.) Marconi was not recognized by the authorities and had to talk his way past guards before he was allowed to board the *Carpathia*. Marconi was originally scheduled to be on the *Titanic's* maiden voyage, but had to cancel due to schedule conflict. Nevertheless, the public came to see Marconi as a hero of the disaster because the *Titanic* had been fitted with radio equipment made by the Marconi company.

The public today naively sees Marconi as the inventor of the modern radio, but Marconi himself saw radio mainly in terms of private long-distance coded point-to-point transmissions rather than voice or music broadcasting, even after the public broadcasting radio craze of the early 20s. And many others had a hand in the invention of radio; indeed Marconi "ran scared" for years in his early career, often worrying that other radio inventors—Fessenden, DeForest, etc.—would eclipse him, particularly in distance transmission.

Although Weightman obviously admires Marconi, he does not shy from presenting less positive aspects of Marconi's life, such as his over-driving ambition, his neglect of family life, and his support of fascism in the 1930s.

These beautifully-told stories are highly recommended for all lovers of technobiography.

♦ ♦ ♦ ♦

McCandless and the Audion
By Gerald F. J. Tyne. Published 2003 as Tube Collectors Association Special Publication No. 6. *TCA Inc., P.O. Box 1181, Medford, OR 97501; website www.tubecollectors.org. 5½ x 8½ inches, 12 pages, softcover. Includes CD of a November 2, 1944 interview of McCandless. $18 for the package, which also includes copies of all TCA publications for 2003. May also be ordered from tca@jkasystems.com using PayPal. Questions to Ludwell Sibley at 541-855-5207 or tubelore@jeffnet.org.*

Who gets your vote as inventor of the radio tube—Edison? Fleming? DeForest? Before you answer spend some time with this latest publication/audio CD from TCA. H. W. McCandless (b. 1866) did not invent the radio tube, but he did craft to order many of the audions that were used by DeForest, Gernsback, Marconi, Armstrong, etc.

Too bad he didn't etch *HWM* on the envelopes of the audions he made. But that type of first-hand brush with history is provided here amply in the audio recording in which McCandless reminisces about his relationships with some of the biggies in early radio. The "live" audio comes complete with missed takes and long pauses by McCandless as he struggles to recall his long-ago pioneering days. As time passes such productions as this one can only gain in value.

SOS Korea 1950 Illustrated

By Raymond B. Maurstad. Published 2003 by Beaver's Pond Press (800-901-3480); website www.bookhousefulfillment.com. 6 x 9 inches, 396 pages, softcover, $16.95.

This is largely the story of American involvement in Korea from the end of WW II through the beginning of the war in Korea in 1950. The story is told through personal biographical accounts of about 100 people. The author/editor was a professional radio operator, and the book is included here because of several chapters covering the role of amateur and military radio communications in Korea at the time. Particulars are supplied for the truck-mounted SCR 399 high frequency radio for telegraphy. Includes about 140 monochrome and color photos of contemporary Korea buildings and scenes.

♦ ♦ ♦ ♦

Also Noted

Albert Abramson, *History of Television, 1942-2000,* McFarland & Company, Inc., 2003, 309 pages.

Lloyd Swackhammer, *Radios of Canada*, Cober Printing Ltd., 2002, 164 pages.

Both these books will be reviewed in the next *OTB*.

OBITUARIES, *continued from page 44*

Right (CBS) for the past 17 years. Dressed in colorful sport jackets and a booming voice he invited the participants to "Come on down!" Roddy began his TV career as the narrator of *Soap* (ABC 1977-1981) followed by game shows: *Whew!* (CBS), *Battle of the Stars* (NBC), *So You Think You've Got Troubles* (syndicated), *Hit Man* (NBC) and *Press Your Luck* (CBS 1983-1986). Hey was the original announcer for *Love Connection* (CBS 1981-1985) before joining *The Price is Right*. His radio career included hosting both music and talk shows on stations in major markets in ten states.

ROSALYN TURECK, 88, (7-17-03) concert pianist. Tureck helped revive an interest in the music of Johann Sebastian Bach during the 1930s and 1940s. She made her debut with the Philadelphia Orchestra under the direction of Eugene Ormandy and toured with Dmitri Mitropoulos and the Minneapolis Orchestra, both in 1936. In 1957 she moved to London because the demand for her Bach performances was greater in Europe than in America. Tureck returned to New York City in 1977 for the 40th anniversary of her *Town Hall Bach* series which she performed at Carnegie Hall. She also held professorships at many institutions, including the Julliard School (1943-1955) and the University of California at San Diego (1966-1972). She founded the Tureck Bach Players, the International Bach Society and the Tureck Bach Institute. Tureck also wrote articles about Bach and a three-volume collection of studies, *An Introduction to the Performances of Bach*.

DAVID WEBSTER, 72, (8-6-03) broadcasting executive. Webster was a member of the British Broadcasting Corporation's (BBC) Board of Management from 1977 until retirement in 1985. He was their representative in the United States from 1971 to 1976, then returned home to become Controller of Information Services and Acting Secretary of the Corporation. In 1977 Webster was named BBC's Director of Public Affairs but returned to the United States in 1981 to become Resident Director. He joined the BBC in 1953 as a trainee and edited their television current affairs program, *Panorama*, from 1967 to 1969. Webster was the founder and Chairman of the Trans-Atlantic Dialogue on Broadcasting and the Information Society.

SHEB WOOLEY, 82, (9-16-03) actor and songwriter. Wooley appeared in more than 60 movies, acted on 50 television shows, recorded popular and country music and wrote songs. His recording of *The Purple People Eater*, for which he wrote the words and music, sold 3 million copies in 1958 and became a number one popular hit. Some of his other compositions include *Are You Satisfied* and the theme to the television show *Hee Haw*. Beginning in 1950, Wooley starred mostly in westerns. Some of his credits include *High Noon, The Outlaw Josey Wales, The War Wagon, Distant Drums, Giant* and *Hoosiers*. Among his television credits are *The Lone Ranger* (ABC), *Death Valley Days* (syndicated), *Hee Haw* (CBS 1969) and *Rawhide* (CBS 1959-1963).

Information for this column was obtained from *The Complete Directory to Prime Network TV Shows 1946-present* (4th ed.), *The Encyclopedia of Jazz* (1st ed.), *Hartford Courant*, *On the Air: The Encyclopedia of Old-Time Radio, QST,* www.broadcastingcable.com, www.canada.com, www.canwestglobal.com, www.cbsnews.com, www.cgi.tennessean.com, www.hollywoodnet.com, www.latimes.com, www.legacy.com, www.nytimes.com, and www.playbill.com.

Thanks to Dr. A. David Wunsch for additional source material.

THE VACUUM TUBE

EDITED BY **LUDWELL A. SIBLEY**, 102 MCDONOUGH RD., GOLD HILL, OR 97525-9626

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Why So Many Tube Types?

Anyone becoming familiar with the world of tubes quickly realizes what an ocean of types there are, in every possible physical format, with design vintage ranging from 1908 to "modern" times. In a perfect world, electronics could have gotten along nicely with perhaps a tenth of the thousands of tube types that exist. The core reasons for proliferation of tube designs were many, some obvious, some more subtle.

• **Technical Progress**. This is no surprise: with development occurring over a period of 70 years, to serve applications undreamed-of in the early years, a host of new designs was natural.

• **Search for a "unique selling proposition."** The smaller tube makers were forever searching for a "hook" to sell tubes that were unavailable from RCA and the other major producers. They tried unique physical variants of standard tubes: Arcturus' blue glass, Raytheon's "Four-Pillar" glass press, Hytron's "bantal" construction (a "GT" bulb on an octal wafer base with metal ring), Majestic's zinc-coated/spray-shielded bulbs, and so on. They also pushed favorite tube types. Triad, in the late '30s, emphasized a line of "Triadyne" output tubes with direct-coupled dual-triode form (the 6AB6G, 6B5, 6N6G, 25B5, and 25N6G). Arcturus, in 1939, introduced a line of multiple-unit tubes for simplified AC-DC radios (the 12B8GT diode-pentode, 25D8GT diode-triode-pentode, and the 32L7GT rectifier-output tube).

The rise of television brought about opportunities for specialized tubes for replacement use. CBS-Hytron introduced its 6CU6 sweep tube as a cure for short life in the common 6BQ6GT. Workman Associates sold a "5TV4" as a 5U4G replacement giving higher B+ voltage. On close inspection, that turned out to be an 83 mercury rectifier on an octal base, with a pair of thermistors in the plate leads to give a "soft" startup. Sheldon sold a "6S78," a 6SN7GT replacement. There were numerous other TV upgrade types.

This search for niche markets was long-lasting. Tung-Sol opened new territory in 1956 by introducing a line of four miniature types, intended for hybrid tube-transistor car radios, that operated with 12 volts on their plates. However, this unique position didn't last. By 1961 the other makers had rushed in with dozens more types for the same use. The radios "went solid-state" shortly afterward.

• **Repackaging of existing, successful types.** This was a perennial practice in the industry. If a maker devised a new favored format, it was easier to sell it to the setmakers if the tubes were electrically the same as familiar types. This let the set people reuse circuit designs and components for "the next season's" radio, and was helpful whether the radio manufacturer had its own design staff or, like the smaller ones, used outside consultants.

The table shows the evolution of several popular tube types between 1934 and 1947, starting with a group of six-volt big-pin types. (Many of these had begun as 2.5-volt versions, but we'll start the discussion after they had matured into the later heater voltage.) A major split occurred in 1935, when RCA shocked the competition by introducing metal tubes. The response from tube makers that didn't adopt the metal design, was to put familiar glass tubes on the new octal base, yielding those "G" types (6A8G, 6K7G, etc.) that are familiar in Philco and Zenith radios. One Philco dealer bulletin sneered, "Present list prices of metal tubes are high. More metal tubes are required to equal the performance obtainable from Philco glass tubes. Poor performance per tube, high cost of metal tubes, production difficulties associated with any new type tube and lack of confidence in tubes kept in stock over a period of time are the major reasons why Philco has adhered to glass tubes."

Some of RCA's metal types were reissued in "single-ended" form, less their grid caps. Other types, intended for farm and automobile sets running from six-volt batteries, got new heaters for half-current (150-mA) operation. Then Sylvania, starting in 1938, released its all-glass "lock-in" or "loktal" format, again with several equivalents of existing types.

Finally, at the end of World War II, RCA put out a line of seven-pin miniature types that replicated the functions of popular octal tubes. This "churn" in the tube world let setmakers, particularly in the area of communications receivers, claim the advertising advantage of using "the latest tubes."

The chart shows only a sampling of this process, ignoring 12-volt or "GT"-bulbed variants and the like.

Repackaging went on until the end of mass-market tubemaking. When GE brought out its Compactron line in 1960, most of its types were rehashes of successful TV types, singly or in multiple. A 6AR11, for example, is a pair of 6GM6 IF pentodes; a 6AL11 is a "sound section in one bottle," with a 6DT6 FM detector and 6AQ5 output tube. When RCA introduced its big nine-pin "novar" format in 1961, many of its types were repackages in the same vein.

As a final example familiar to the tube-audio hobby, Westinghouse put out the 7591 high-sensitivity output tube in 1960. Sylvania countered

EVOLUTION OF POPULAR RECEIVING TUBES—1935-47

BIG-PIN PROTOTYPE	METAL	OCTAL "G"	SINGLE-ENDED METAL	150-MA FARM/AUTO	LOKTAL	MINIATURE
Rectifiers						
80		5Y3G[1]				
84/6Z4	6X5[2]	6X5G			7Y4	6X4
5Z3	5T4[3]	5U4G[4]				
Triodes						
76		6P5G				
	6C5	6C5G				
	6F5	6F5G	6SF5		7B4	
Duodiode-Triodes						
75[5]		6B6G	6SQ7		7B6	6AV6
	6Q7[6]	6Q7G	6SZ7	6T7G	6AT6	
85[7]		6V7G[7]				
	6R7G[8]	6SR7		6ST7	7E6	
Pentodes						
77	~6J7	~6J7G	~6SJ7	6W7G	7C7[9]	
78	6K7	6K7G	~6SK7	6S7[10]	7A7	6BA6[11]
6D6		6U7G				
Pentagrid Converters						
6A7	6A8	6A8G		6D8G	7B8	
			6SA7[12]		7Q7	6BE6
Class-B Duotriodes						
79		6Y7G				
Power Pentodes						
41		6K6G[13]				
42	6F6	6F6G[13]				
43	25A6	25A6G[13]				
Eyes						
6G5/6U5					6AB5/6N5	

Notes

1. With new pinout, became 5Y4G.
2. Uprated 16% on output current.
3. Fil. current reduced; other ratings same.
4. With new pinout, became 5X4G.
5. $\mu = 100$.
6. $\mu = 70$.
7. $\mu = 8$.
8. $\mu = 16$.
9. Heater reduced to 150 mA.
10. Also single-ended 150-mA version, 6SS7.
11. G_m raised. Also 150-mA version, 6BJ6.
12. Functions of grids 2-5 revised.
13. Development of this series stopped here—beam power tubes took over.

with the 6GM5, the same tube but in their then-favored "9-T9" format (a 9-pin miniature base with a a T9 or GT-size bulb). RCA's answer was the 7868, with the same performance but in novar form.

• **The drive to improve popular types**. Tube technology has so many potential performance problems that there are boundless ways to improve it. The humble 12AU7, for example, with extra process controls and testing, turned into a JAN military version. At the behest of the airline industry, the 12AU7 was reworked into the high-reliability 5814, registered by GE in 1949. RCA once planned to sell the 6139, a 12AU7 with low grid current and close balance between sections, specifically for use in vacuum-tube voltmeters. For use in early digital computers, RCA registered the 5963 with high-purity nickel cathode tubing for long life. Another computer variant was CBS-Hytron's 7318.

The 6680 was a 12AU7 for mobile-radio use, registered by GE, capable of operating with heater voltage from 10.0 to 15.2. RCA developed the 7026 (a quiet 12AU7) as a companion to their 7025 (quiet 12AX7), but the 7026 apparently didn't "make it" commercially. The 7730 was a CBS-Hytron "instrument" version rated for 10,000 hours. An STC (British) premium 12AU7 was the 7489.

• **Concern over safety**. There were two safety hazards related to tubes. First, in the early '40s the Underwriters Laboratories put limits on the AC shock current that a radio chassis could produce (i.e., no more hot-chassis killers). It was noticed that a radio owner, after taking the tubes out for testing, could get them into the wrong sockets and cause a shock hazard. The culprits were the pinouts used by specific tubes.

In, say, the Sea Pal 101 radio (see Rider's), swapping the 1A7GT and 117L7GT would put 117 VAC on the base shell of the 1A7. Also, under specific conditions an otherwise safe AC-DC set could develop a hot (or at least "warm") chassis. In many postwar miniature-tube AC-DC sets, interchanging the 50B5 and 12BA6 could yield AC on the chassis via the AVC line. The same went for many AC-DC-battery radios, in which confusing the 3Q4 with the 1R5 could put plate voltage on the tuning capacitor. To fix these problems, new safe pinouts on old types yielded the following tubes:

Old	*New*
3Q4	3V4
35B5	35C5
50B5	50C5
117L/M7GT	117P7GT

The other safety concern addressed a more insidious problem. In the late '60s, the story broke about some color TV sets putting out unacceptable levels of soft X-ray radiation, particularly if the high voltage on the picture tube were adjusted too high. The X-ray sources were the HV rectifier, HV shunt regulator, and the CRT.

General Electric ran a recall program to replace shunt regulators (6EA4, 6EF4, and white-branded 6LC6) in their color sets, and put out a money offer to buy back any spares that were in shop stocks. RCA's 1970 response to the problem was to issue a group of rectifiers (1AD2A, 1BC2A, 1BY2, 1G3GTA, 1K3A, 1X2C, 2AS2A, 3A2A) with 49% lead-glass bulbs. The same applied to shunt regulators (6EL4A/6BK4C, 6EM4), which got thicker bulbs.

All received radiation-limit ratings, for example, 0.5 milliroentgens per hour (mR/hr) for the 3A2A and 6EM4. So did picture tubes: the 25VABP22 was rated at the same 0.5 mR/hr with 35 kV and 300 µA on the anode. GE introduced the 3DS3, an octal HV rectifier molded into a heavy rubber-and-lead shield from top cap to base and weighing an extraordinary six ounces. It too was rated at 0.5 mR/hr, whereas several other GE rectifiers were rated at 25 mR/hr.

• **The triple-heater TV market**. A further cause of "type proliferation" in later years was the need for multiple heater ratings. In the late '60s, as the radio and audio markets were lost to solid-state, the tube makers focused on television as a last stand. They put out new tube types narrowly optimized for minimum-cost receivers. By then, setmakers needed three lines of tubes, to handle 450-mA series heater strings, 600-mA series strings, and 6.3-volt parallel operation. Thus most new tubes had to come out in triple versions.

The registration people at the Electronic Industries Association were helpful in naming the new types, keeping the same letters and suffix number despite changes in the heater-voltage number. A series like 3AU6 - 4AU6 - 6AU6 (3.15 V @ 600 mA, 4.2 V @ 450 mA, and 6.3 V @ 300 mA respectively) is clear enough.

However, EIA often violated this rule: there was an audio triode-power-pentode confusingly coded 6BM8, 8B8, 32A8, and 50BM8 (6.3 V @ 780 mA, 8.0 V @ 600 mA, 32.0 V @ 150 mA, and 50.0 V @ 100 mA respectively). The "6BE6" family was identified in similar irregular fashion, running 3BE6 - 4BE6 - 6BE6 - 12BE6, but then continuing as 18FX6 - 26D6.

• **More powerful sweep tubes**. The number of TV horizontal-sweep tubes had to grow with time to keep up with the need for more deflection power, as picture tubes with 50° deflection

(continued on page 52)

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Technical and Legal History of the "Bug" Trademark

There are two meanings for the term "bug" in the history of the telegraph. One had its roots in a technical problem; the second in an affectionate nickname given to semi automatic "transmitters."

I will examine both meanings in this article.

During the 1870s, long before the semi automatic key appeared, the term "bug" had a very specific meaning for telegraph engineers and inventors. It was commonly associated with false signals that were heard on Quadruplex circuits.

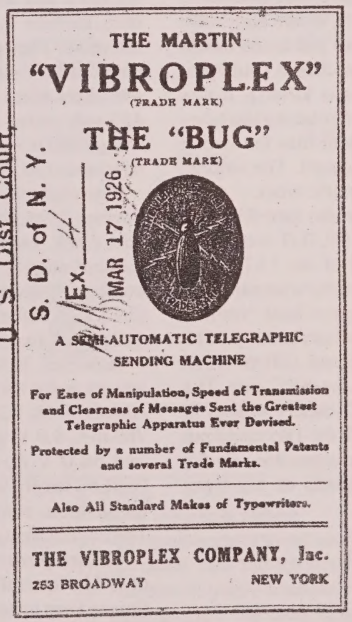
The Quadruplex allowed four simultaneous messages to be transmitted on a single wire — two from each direction. One of the relays used in the "Quad" was called a neutral relay. When the current was reversing polarity on the line, there was a period when there was no magnetism in the coils of the neutral relay. The armature then had a tendency to fall back on its stop, generating false and interfering signals, or breaks. This unwanted movement of the armature was considered to be the "bug."

Thomas Edison's early Quad designs were plagued with this problem. Unable to eliminate the cause of a problem, he came up with "an arrangement that rendered the effects insignificant." Various electro-mechanical circuits that Edison called "Bug Traps" were designed to take care of this transition time.

Edison's first bug trap consisted of a repeating sounder installed between the neutral relay and the local sounder. The delayed response of the repeating sounder isolated the false signals from reaching and activating the local sounder. Later, several other inventors came up with their own designs to eliminate these false signals. By 1890, the term "bug" had evolved to generally describe a fault on telegraph multiplex systems and was used to identify the source of a problem on a circuit.

When the first semi-automatic keys appeared on the wires around 1904/1905, they were originally advertised as, and called, "transmitters." The first telegraphers to use the transmitters were some of the best in the country. They were considered "First Class" or "A1" telegraphers and worked the important circuits where speed was necessity. Naturally with that much practice they soon mastered the new transmitters.

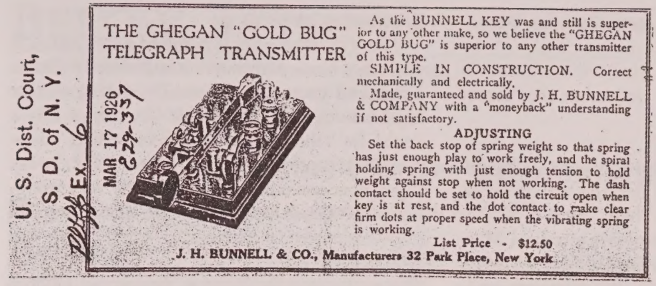
By 1908 the instrument began to be more widely used, even by telegraphers who worked slower speed circuits with plenty of intervals having no activity. These telegraphers were often criticized for causing many errors. Their lack of experience and misadjustment of the transmitters sometimes resulted in excessive and "clipped" dots. It was around this time that the telegraphers started to use the nickname "bug."



Plaintiff exhibit 4, showing use of the term "bug" in a Vibroplex ad.

In 1913 Donald McNicol, an engineer, professor, and former telegrapher, had this to say about the transmitters: "...although the sending machines at present in use have surely made for increased speed of signaling, they have, in many instances, been the cause of poorly founded reflections being cast upon the electrical efficiency of a certain class of circuits." Telegraphers using the instruments had to learn to modify their sending technique and speed, depending on circuit conditions, in order to prevent false signals from being transmitted.

During the 1920s the contemporary meaning of "bug" and the right to use the word in trade was challenged in court. The dispute was between two of the best



THE GHEGAN "GOLD BUG" TELEGRAPH TRANSMITTER

As the BUNNELL KEY was and still is superior to any other make, so we believe the "GHEGAN GOLD BUG" is superior to any other transmitter of this type.

SIMPLE IN CONSTRUCTION. Correct mechanically and electrically.

Made, guaranteed and sold by J. H. BUNNELL & COMPANY with a "moneyback" understanding if not satisfactory.

ADJUSTING

Set the back stop of spring weight so that spring has just enough play to work freely, and the spiral holding spring with just enough tension to hold weight against stop when not working. The dash contact should be set to hold the circuit open when key is at rest, and the dot contact to make clear firm dots at proper speed when the vibrating spring is working.

List Price - $12.50

J. H. BUNNELL & CO., Manufacturers 32 Park Place, New York

U. S. Dist. Court, S. D. of N. Y. Plff Ex. 6 MAR 17 1926 22-337

Plaintiff exhibit 6, showing use of the term "gold bug" in a Bunnell ad.

known key manufacturers is the U.S.: The Vibroplex Co. and J.H. Bunnell & Co.

Vibroplex attempted to stop J.H. Bunnell & Co. from using the word "bug" in the name of its "Gold Bug" instrument. In an earlier lawsuit and appeal, the company had tried, and failed to stop the manufacture of the Bunnell "Gold Bug." Prior to this, Vibroplex had a very successful track record of stopping competitors in their tracks, and in some cases even preventing them from getting beyond the experimental stage.

Vibroplex felt that their only legal option was now to try and stop Bunnell from using the "Bug" name. However, in a bitter legal battle, the company lost the trademark suit in both the lower and appeal courts. Underlying the judges' opinions in both courts are some interesting details on the history and use of the name "bug" and the character of the two companies selling the instruments. I will highlight the arguments for both sides.

First the arguments by Vibroplex: Their position was that rights to a trademark derive solely from use of the term in trade, and not at all to its use in mere conversation. On or about March 1, 1919, the company adopted and began to use three new trademarks. First, the representations of a bug with conventional lightning rays radiating from it. Second, the words "Lightning Bug," and third, the word, "bug" itself. The three marks, along with the name "Vibroplex," were placed on all machines that they manufactured from that date.

The firm claimed that there was not one instance of the word "bug" having been used in trade by anyone prior to its own adoption as a trademark on March 1, 1919. Vibroplex formally applied for the three new trademarks a year later, on May 11, 1920. The company stated that over the years there were sporadic efforts by other manufacturers to introduce similar machines, possibly 10 to 12 in number. All were said to be short-lived and of "little substantial merit."

The machines mentioned included Mecograph, Autodot, Peerless, Dunduplex, Duntriplex, Duncushion, Coulter, Dinger. Abernethy, National and Ultimate, The word "bug" was never applied to any of these instruments by an inventor, maker or seller. Vibroplex challenged Bunnell to produce an ad that showed the term being used in describing an instrument.

Bunnell's position was that, with Vibroplex's "broad patents" about to expire, Vibroplex decided to attempt to trademark the common name "bug," well aware of the fact that it had been used for at least a dozen years previously. In 1913, six years before Vibroplex claims to have first used the name "bug," Bunnell had designed an experimental semi-automatic key of its own and named it "Gold Bug." They felt that Bunnell had the right to use the "Gold Bug" mark in trade just as Vibroplex has the right to use the "Lightning Bug" mark.

They stated that all "fluttering arm, multi-legged-appearing telegraph keys", had been known as, and called by, the common term "bug" by everyone in the telegraph art or trade. And that term was used to distinguish such instruments from the other "genus telegraph key, the Morse" which was made and sold by many manufacturers. The entire trade applied the word "bug" not only to Vibroplexes but to all other similar instruments known to telegraphers.

In the Appeal case, Bunnell cited the lower court's decision by Judge Francis Winslow who stated: "This vibrating or fluttering arm, because of its aptness, probably suggested the name "bug." Bunnell argued that Vibroplex would have more of a case if Bunnell were calling their instruments Bunnell Vibroplexes, but instead thought Vibroplex was trying to take a public word and turn it into a private monopoly. "The case is precisely the same as if a plaintiff piano-maker were seeking exclusive trade-mark to the name "piano."

During the lower court case, Bunnell's lawyer, Philip Farnsworth grilled Vibroplex President James Albright on the stand. Here is a brief, yet amazing, sample in which Farnsworth is trying to get a reluctant Albright to name the machines produced by its competitors in the past:

Farsnworth: "You know that there were a number of machines, six, or eight, or ten machines; what were their names before 1920, give us a list; you were president of this concern ?"

Albright : "I do not remember."

Farnsworth: "Do you remember the "Mecograph" bug?"

Albright : "Oh, yes."

Farnsworth: "Do you remember the "Auto-Dot" bug?"

Albright: "Yes"

And one by one Farnsworth asked Albright for the names, each time framing his questions with to include the term "bug," until it was finally objected to by Vibroplex's attorney, Murray Corrington—but overruled. Judge Winslow asked Albright if there was any relationship between the fact that his trade mark applications were filed in May of 1920 one month before the first of their four primary patents was going to expire and wanted to know if there was any significance in that. Albright's answer: "None that I know of."

In January of 1928 the U.S. Circuit Court of Appeals upheld the lower court's decision in favor of J.H. Bunnell & Co. The three circuit judges in their Opinion stated: "a mark is less likely to signify origin when it is accompanied by others than if it stands alone."All this legal activity obviously had little effect on Vibroplex's popularity. The Bunnell Gold Bug was short lived and quickly faded.

The Vibroplex Bug is admired today just as it was when Horace Martin first introduced it almost a hundred years ago. Ironically, during all this legal activity, J.H. Bunnell & Co. was an active dealer for Vibroplex and had been selling Vibroplex Bugs continuously since around 1912. Today if you hear one on the air it is usually very recognizable, because it simply sounds like a "bug."

SOURCES

Electricity and the Electric Telegraph, George B. Prescott, 1877

The Quadruplex, WM. Maver Jr. & Minor Davis, 1890

American Telegraph Practice, Donald McNicol, 1913

The Papers of Thomas Edison Vol.II, Rosenberg, Israel, Neir, Andrews, 1991

National Archives and Records Administration, New York, N.Y.: U.S. Circuit Court of Appeals, Second Circuit, January 1928

U.S. District Court for the Southern District of New York, May 1927

"The Vibroplex Co. Inc. vs. J.H.Bunnell & Co., on Trade-Mark, Bug," Files E29-337/ 9720.

VACUUM TUBE, *continued from page 49*

yielded to 70°, 90°, and then 110°. The arrival of color, with the need to power three electron guns, aggravated the need. Thus sweep tubes of postwar design grew in dissipation rating:

6AU5GT	(1949, 8 W)
6BQ6GT	(1949, 10 W)
6DQ6	(1955, 15 W)
6DQ5	(1957, 24 W)
6KD6	(1965, 33 W)

Further multiplication of sweep types came from the tendency to release a given design with and without a top cap (e. g., 6GT5 vs. 6GJ5). Other types were derived from conventional designs, but with the suppressor grid pinned-out separately for use with a bias circuit that suppressed "snivet" oscillation in the picture.

A further source of new types was the rise of Japanese exports of TV sets and tubes in the early '60s. From far-away places, these had "strange-sounding names" like 6G-B3A, 6R-HH2, or 12G-K17. Many were dual-numbered with EIA identifiers; some were not. As the replacement market grew, some U.S. tubemakers like Raytheon distributed these types themselves.

The above suggests that most of the proliferation in tube types can be ascribed to (read: "blamed on") the TV industry. By contrast, makers of communication gear and hi-fi systems were very conservative, sticking for decades to familiar tubes like the 6BA6. Only late in the game did they make much use of the new types that had been developed for TV use.

Proliferation of types in the TV field came down upon the poor service technician, of course. In 1950 the typical serviceman's tube caddy held about 100 types. By 1970 caddies had grown to capacities of 400 or so tubes, and it was not unknown to carry two caddies on the service truck!

Tube Collectors Association Celebrates Fifth

In closing, it is timely to note that the TCA has completed five years of service to the historian-user-collector community. Founded in 1999 at the suggestion of serious collector Al Jones, W1ITX, the group closed 2003 with 350+ members in 18 countries. The Association has focused strongly on publishing tube literature, and has brought out a good deal of previously unknown history. For details, interested readers are welcome to contact the writer at (new address) tubelore@jeffnet.org, or on (541) 855-5207.

BELOW 535

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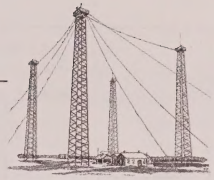


Power Line Carrier Communication

Part 1 — Technical Issues

Introduction

This article will briefly discuss the more than 75-year-old technology for using power lines as a means to "hard-wire link" communications devices. Power lines snake their way through most of the world, primarily to provide the operating power for electrical and electronic devices. But the lines can also act as a "conduit" to rout information generated by one or more transmitting devices to one or more receivers. The scale of the power line communications may range in size from connecting a few electronic devices to interconnecting a large network covering hundreds of square miles. In a quick "paint brush" manner we will review some of these applications, starting with a few of the smallest applications and moving on to the hotly disputed PLC systems that may wreak havoc with radio reception over many thousands of square miles.

The PLC Concept

PLC, or power line carrier communications, was also known as "wired wireless" before and during World War II. It is a means to use AC, and in places DC, power lines to transmit data, control signals, and/or audio information. The PLC signals take the form of modulated RF carriers superimposed on the power lines. There is no mixing, or heterodyning[1], of the power line frequency with the PLC frequency. The transmission path may be simplex, half duplex, or full duplex (1). Such systems are generally used for localized communications, usually over a distance of not more than a few dozen miles; frequently no more a few hundred feet. The RF carrier frequency may range from below 100 kHz to a few MHz. There are concerns now, as there were in the past, about radiation (and conduction) of RF signals into and out of the power line. There is strong evidence that RF communications services depending on weak electromagnetic radiation picked up by antenna systems can suffer from significant co-channel interference.

We must also remember that electromagnetic interference is not just generated by PLC systems. There have always been concerns about unwanted signals radiated from electronic devices—whether into space or back through the power line. These effects have names like BCI, RFI, TVI, etc. Such problems have resulted in customer demands, government legislation, and design requirements for more sophisticated and sensitive equipment.

The Transmission Line

When we draw schematics we usually assume that connections between components are made with "ideal wire," that is the wire with no distributed inductance, capacitance or resistance. Additionally, our ground symbols represent an ideal "ground circuit return wire." This ideal ground has "zero impedance" at all frequencies of interest, i.e., no resistance, and no reactance. In reality every length of wire and every square inch of chassis is a transmission line, which can also act as a transmitting or receiving antenna.

At audio through the lower part of the HF band, we can usually get away with a fair amount of slap-hazard construction practices when we interconnect the real components. However, depending upon the circuit and specific physical construction practices used, we may find that interconnecting wires and grounds stop behaving in an

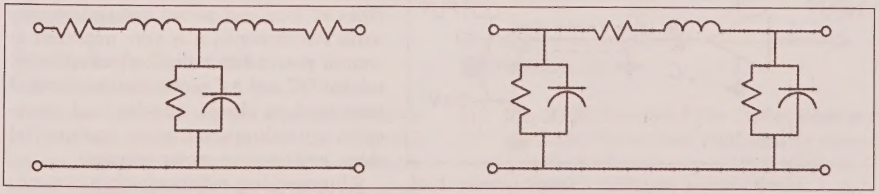


Fig. 1. Transmission line models: "T" at left, "PI" at right.

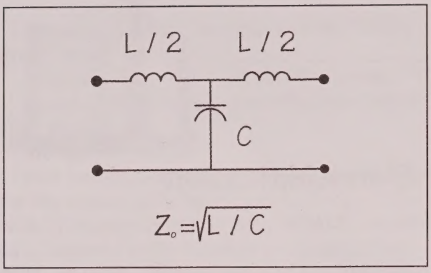


Fig. 2. Low-loss RF transmission line model. Zo = (L/C)1/2 where L=line inductance per unit length, C=line capacitance per unit length.

"ideal" manner at frequencies well within the HF spectrum (3-30 MHz). The interconnections start to behave as "transmission lines." We can either implement remedial designs or avoid addressing the problem and allow the circuit's performance to be compromised.

Circuit theorists electrically model transmission lines in many ways. Two of the more popular models are shown as Figure 1 (2). These models are used to analyze systems employing coaxial and parallel wire lines for RF and DC, as well as the low frequency AC power lines used for long distance electrical power transmission and neighborhood power distribution. The model may change if the line's "quality" improves, i.e. certain losses become very low—for example as frequency is varied. Thus one model may be used at power line frequencies, and a second at the RF frequency range used for a PLC system. At RF, some transmission lines are good enough for us to eliminate the model's resistive losses (Figure 2). Additionally, a general assumption for modeling is that "the transmission line does not radiate." This is not a 100% valid assumption. Transmission lines do radiate. Three common reasons are:

1. The line intercepts or emits radiated energy, commonly referred to as the antenna effect (3).

2. There is incomplete cancellation of the electromagnetic radiation about the line's conductors, i.e., for parallel wire lines, the line spacing is to large [see (4) and Table 1], or the current flow on the two wires is not equal and opposite.

3. The coaxial line's shield is incomplete. In general, as frequency increases there is a higher propensity for greater transmission line radiation (5).

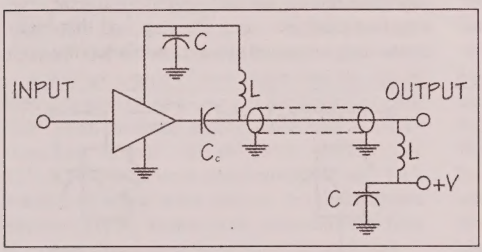


Fig. 3. MMIC-based amplifier circuit carries both power and signal (see text).

Table 1 - 1% Spacing Rule of Thumb For Parallel Wire Transmission Lines To Minimize Radiation

MHz	λ meters	% λ inches
100	3	1.181
30	10	3.94
10	30	11.82
3	100	39.37
1	300	118
0.30	1000	394
0.185*	1622	639
0.132**	2273	895
0.10	3000	1181
0.03	10000	3937

* A typical frequency for the "no-license" 160-190 kHz experimenter's band in North America.

** A typical frequency now enjoyed by licensed amateurs participating in the formally assigned amateur LF band in the UK, Europe, and other parts of the world.

We must remember that DC and low frequency AC power lines and power distribution systems are designed primarily to deliver safely the electric power required by the customers' electrical and/or electronic devices. The materials used and line's physical dimensions are chosen to handle reliably the voltage and current appearing on the line as well as environmental considerations that might affect transmission. For DC and low frequency AC power lines the effects of weather extremes on the insulators and conductors, and the required span lengths between supporting outdoor poles and towers, must be taken into consideration.

Suppression of RF radiation from power distribution systems has generally not been a design consideration, except in certain types of localized power distribution systems. For example, it is very important to control power line radiation/pickup in localized DC and AC power distribution systems used on planes, missiles, and spacecraft, on military and some commercial ships, and on some motor vehicles.

RF power line radiation/pickup concerns are also addressed (but not as thoroughly as

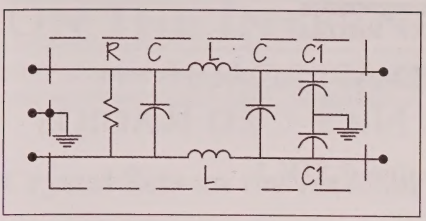


Fig. 4. EMI filter carries 10 A @ 120/250 VAC, 50/60 Hz. R=1.5 meg, C1=0.1 mF, C=0.0055 mf, L=0.495 mH.

sometimes required) for certain types of electronic equipment, including transmitters, receivers, digital computers and their peripheral devices. Regulations have long been established to control radiation generated by the RF circuits and the vertical and horizontal sweep circuits of consumer TV sets. The controls cover radiation back through the AC power line as well as out the case and antenna.

Finally let's consider the transmission line's "characteristic impedance" or "surge impedance." We are all familiar with the design goal that for RF application the transmission line should be driven by, and terminated (loaded) by, devices having an impedance equal to the line's characteristic impedance. This is required to minimize power loss within the line.

For regular telecommunications applications, matching is not a problem. Not so for PLC systems! The PLC designer must frequently make use of AC and DC power lines that have many branches. Connected to one or more taps on each branch may be all kinds of electrical and electronic devices.

Some of them may have a built in power line "noise suppression" circuit, for example, a shunt capacitor at the input terminals. There may also be step up or step down transformers, or even "power line conditioners" whose purpose is to filter out the junk that may be riding on the AC or DC power line. There may also be electrically filthy devices such as SCR incandescent lamp dimmers or motors with commutators as used in hand power tools and kitchen appliances. Thus the PLC designer is frequently faced with trying to propagate RF energy through less than an ideal transmission line.

Small-Scale Power-line Communication

Figures 3 and 4 are simple modern circuits associated with small-scale power line communications. One or more lines carrying both electric power and signal energy may be involved. However, the signal is (usually) not permitted to propagate beyond very well defined limits.

Figure 3 is a possible amplifier design using a single coax cable to carry both power and the RF signal. The active device could be a single- or multiple-stage MMIC[2] based amplifier used as a masthead-mounted 70-cm receiving-type RF preamplifier. The remaining receiver structure is located in the shack. An appropriate low-loss coaxial cable interconnects the preamp output to the receiver input. Cc is a coupling capacitor used to isolate the amplifier's output from the DC voltage V+. The L and Cs form a low pass filter that keeps the amplifier's RF output from being shunted to ground by the DC power supply or the amplifier's DC input.

Figure 4 is an example of an "anti-PLC" type of circuit. This circuit is a filter used to keep unwanted RF on a power line from entering an electronic circuit, or to keep unwanted RF generated by a particular line-powered electronic circuit from entering that power line. There are simpler versions of this "anti-PLC" circuit. For example, low-pass LC or RC filters in the B+ lines feeding vacuum tube plates and screen grids, in the negative voltage supply to control grids, or in the 12 VDC buss feeding solid state equivalent circuits.

I'm sure we are all familiar with the simplest and probably most common "anti-PLC" circuit, a 0.01 µF bypass capacitor. We see this type of anti-PLC circuit connected across the 120 VAC line as the line cord enters an electronic device, such as a table radio.

[1]Heterodyning takes place in circuits whose input/output characteristic is non-linear with amplitude. Power lines, as well as coax and shielded cables and common point-to-point wiring, are devices whose characteristic is linear with amplitude.

[2]Monolithic microwave integrated circuits. These are high-performance self-contained RF amplifiers that perform well into the microwave spectrum. Typically they are a four-terminal device, and have a 50-ohm input and output impedance. See (5) for additional information.

The conclusion of this article, "Large Scale Power Line Communication," will appear in the next issue of The OTB.

REFERENCES

(1) *The ARRL Handbook For Radio Amateurs for 2000*, 77th edition. Published by American Radio Relay League, 1999. Pages 23.4 to 23.5

(continued on page 58)

BY BILL FIZETTE, W2DGB

A STRUCTURED APPROACH TO FIXING UP THOSE NICE OLD RADIOS

More on the National SW-3

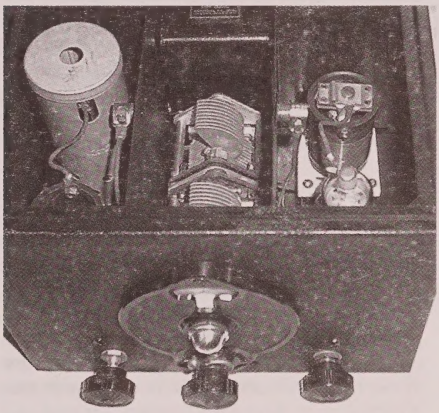
In the aftermath of my two November 2003 columns dealing with the legendary National SW-3 regenerative receiver, several items have come to light.

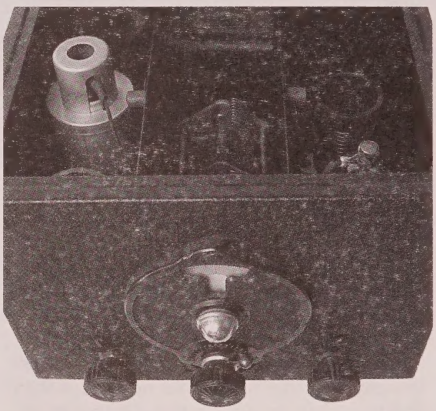
In the "OOPS" category, I had commented that the National Company began as a manufacturer of radio parts. What I meant was that the National Company entrance into the radio field was as a manufacturer of radio parts. The company was incorporated in 1914 as the National Toy Company, and they made power plant items, household items, and... toys. National began making radio parts in 1922.

Another "OOPS" item involves the S-101 coupler diagram on page 56 and its accompanying text on page 57. The correct capacitor value is 0.01 mFd, not 0.1 mFd as indicated.

For the record, the tube shield shown in the photos on pages 54 and 56 is the National type S with the large cap, which is the one I happened to have in my shop. The correct shield on the original receiver was the type T58 with the smaller turret-style cap.

Paul Bohlander, W3VVS, commented about the National ad that was reprinted on page 29. "The National ad that appeared in the October 1931 issue is very interesting. If you have the *QST* issue, the picture at the upper left is of the very first Model 1 without the tube shield on the RF tube. Look closely and you will see the outline of the 3¼" × 3½" shield that was placed between the coil and the RF tube to prevent stray coupling between the tube plate and the coil. The shield was fastened to the chassis with two self-tapping screws randomly located on the lip at the bottom of the shield. Later versions incorporated a tube shield."





Author's SW-3 (left) has type S tube shield and a set of bandspread coils. Compare with SW-3 at right, which has the correct type T58 shield and one of the general coverage coil sets.

Reader Tom Turner, K8VBL/VP2VEL, wrote: "A number of years ago I bought an SW-3. The type B dial was missing, and the National special coil sockets had been replaced by standard six-pin sockets. Inside the lid a name plate was riveted, "Clough-Brengle Co, Chicago. There was no grease-pencil red "OK" in the corner of the lid, as was generally written by Cal Hadlock when he checked out the completed SW-3s. The dial and the coil sockets were replaced, and new coils were wound on National forms, but the RF stage would break into oscillation at high settings of the

(continued on page 58)

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ON THE INTERNET

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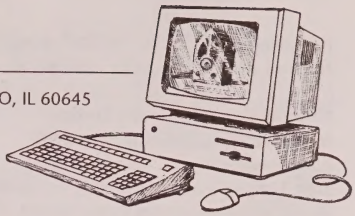
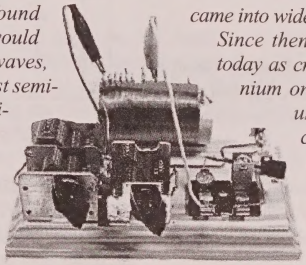


Crystal Sets on the Internet



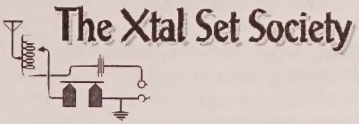
In 1906 H. H. Dunwoody found that carborundum crystals would act as a detector of radio waves, thereby discovering one of the first semiconductors. G. W. Pickard experimented with other crystalline minerals having semiconductor properties, patenting the use of silicon, pyrites and other substances for this purpose.

Unlike the coherers then commonly used for receiving radiotelegraph signals, these crystal detectors didn't need elaborate "de-cohering" or resetting schemes. They were also more sensitive to weaker signals, thus expanding the range of practical communications. Later, galena (lead ore) crystals came into wide use as a radio detectors.

Since then, crystal detectors, (also known today as crystal diodes) are made of germanium or silicon semiconductor material, usually sealed in glass. Today's crystal diodes are much more stable than the old open potted pyrite or galena crystals and, unlike them, have no external "cat's whisker" contact wire requiring fussy adjustment.

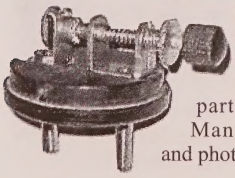
Today there are many crystal set enthusiasts that enjoy building and using sets employing this grass-roots approach to radio communications. Collected here are some well known websites that can introduce you to the exciting world of crystal radios.

The Xtal Set Society
http://www.midnightscience.com/
This is an entire site about building Crystal Sets. The Xtal Set Society publishes a newsletter and numerous books, all of which you can find more



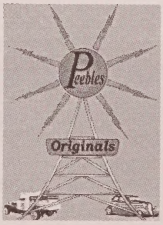
information about on their site. Host an on-line forum related to crystal sets and related subjects. You can find plans to build a Quaker Oats box crystal radio and a Cigar Box Crystal set, as well as suggestions for science fair projects, crystal radio parts and supplies and more....

Gollum's Crystal Receiver World
http://home.t-online.de/home/gollum/homepage.htm
Crystal receivers, construction projects and plans, old-time crystal sets, hints, crystal receiver store. History, information, projects, parts store, user forum. Many European models and photo gallery.



Al Klase's Crystal Set Design 102
http://www.webex.net/~skywaves/xtal/xtal.htm
This site has several pages of interest to the crystal radio enthusiast. You'll find "Crystal Set Design" 102, a crystal set tutorial, and some nice tips for mounting crystals to use in detectors. You'll also find photographs of some of Al's radio reproductions.

Peebles Originals
http://www.peeblesoriginals.com/
Mike Peebles' website is dedicated to the preservation of vintage radio building and other hobbies. Mike has been producing crystal radios, tube radios, transistor radio kits, and informative instruction articles, since 1988.



Owen Pool's Crystal Radio Resources
http://www.thebest.net/wuggy/
Providing a "pretty good set" of resources and ideas for the crystal radio enthusiast. Owen's site also has an extensive list of crystal radio links, tips on things such as bandspreading and DX, and plans for building a convertible crystal radio (you

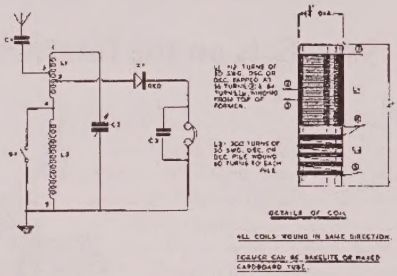
can swap in a simple "triode" detector/amplifier), an RF signal booster, and more.

Crystal Radio Systems: Design, Measurement and Improvement
http://uweb.superlink.net/bhtongue/
Ben Tongue's articles related to crystal set design, measurement and improvement. Detectors, headphones, coils, audio transformers and more.

Crystal Radio
http://crystalradio.net/
Darryl Boyd's ever expanding website. Good info on sound-powered headphones. Largest collection of published crystal set plans available.

Yahoo Crystal Radio Group
http://groups.yahoo.com/group/CrystalRadio/
A discussion group for lovers of old-time radio concepts. Crystal set designs, super-regeneration sets—you name it!

Last but not least is this great pair of books on all aspects of the crystal set: *Crystal Clear: Vintage American Crystal Sets, Crystal Detectors, and Crystals*, Volumes 1 and 2, by Maurice L. Sievers, Published by Sonoran Publishing. Volume 1 contains hundreds of photographs and ads identifying the many different commercial models of



crystal type radios and crystal detectors made in the USA from 1920 to 1950. Company histories are also included. Volume II is one of the most accurate and comprehensive guides to American-made crystal radios. Available through The Xtal Set Society (above) or Antique Radio Classified's website at www.antiqueradio.com

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BELOW 535, *continued from page 55*

(2) *Networks, Lines and Fields* by John Rider, 2nd edition, 5th printing. Published by Prentice-Hall, Englewood Cliffs, NJ, September, 1960. Chapters 4 & 6, and Section 7.3.
(3) *The ARRL Antenna Handbook*, 17th edition, 2nd printing. Published by American Radio Relay League, 1994. Pages 26-13 and 27-7.
(4) Ibid, page 24-1
(5) *The ARRL UHF/Microwave Experimenter's Manual*, 2nd printing. Published by American Radio Relay League, 1991. Page 5-12.

INTERNET REFERENCES

Information on RF grounding (with special thanks to the AWA Web Page Coordinator Chuck Schwark):

- http://www.arrl.org/tis/info/tech.html
- http://images/ecmweb.com/files/31/0900groundrods/pdf

Information on early "Wired Wireless":

- http://earlyradiohistory.us/. Use this web site's search engine to find six articles published in the first half of the 1920s.

A STRUCTURED APPROACH, *continued from page 56*

RF gain pot. I checked the screen bypass and ground connections to no avail. In desperation I compared the wiring "dress" to that of my "old standby" SW-3, and found that the lead from the RF tube plate to the detector coil primary was routed incorrectly! When the lead was properly routed, the set performed as designed."

Finally, the writer was fortunate enough to find another article by Bill Orr (1), which included material on the SW-3. Two points emerged; first, that the impetus for the development of the SW-3 came from the fact that Pan American Airways was looking for a compact, reliable, light-weight receiver for their early flights to South America. Second, National's special bandspread plug-in coil design was a "stroke of genius." It spread the amateur bands out over the 270-degree range of the tuning dial. This had never been commercially attempted before, and the six-prong National coil was ideally suited for the concept.

REFERENCE

1(1) Orr, William, "Milestones of Amateur Radio—A Personal Voyage. The Amateur Receiver Over the Years" *CQ*, March 1992.

RADIO REPRODUCERS

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Crosley Headphones

Along with horn and cone-type speakers, the headphone was among the early instruments for reproducing sound from the early receivers. Joining me in this column is Bob Sukosky of Manchester, CT, who is continuing the work of the late Dick Mackiewicz in the history of radio headphones.

Bob and I ask the same question: "Where have all the Crosley headphones gone?" Usually when Powel Crosley manufactured something, he mass-produced it by the thousands. Not these. Seems they are a scarce item in the radio collecting hobby. What varieties are found are discussed here.

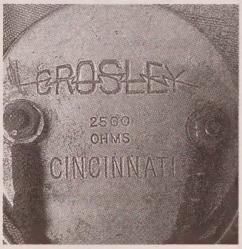
The most common pair you may find are the ones marked "Crosley-Cincinnati." These are 2500 Ohm headsets with a black "molded mud" ear-piece and, as with all Crosley phones, the outer case is of aluminum. Also found are headsets of the same construction, but stamped: "Crosley-2500 Ohms-Cincinnati." These phones are somewhat harder to find than the first mentioned pair, but otherwise identical.

The standard Crosley headphone box is illustrated with a girl and a Crosley Model 51-S receiver—which dates it as late 1925. The original boxes had black-and-white graphics and were marked with a $2.50 price. Later the graphics became multi-colored and the price was raised to $3.00.

Bob Sukosky has found a rare pair of "Musicone Balanced Headset" phones, which were made for the Canadian market. These were 2000-ohm units, and had a highly polished aluminum finish and a more decorative stamping. But, unlike the U .S. type, the ear piece is of a reddish-brown swirl color. The Canadian box is plainer than the U.S. version, and has an orange-white-and-black label.

Crosley headphones are much desired by radio collectors. If you do find another variation of what we show here, please let us know.

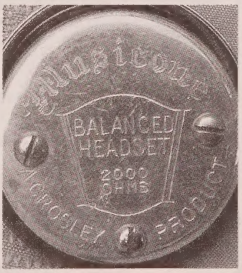
Most often seen version of the Crosley headset is marked only with Crosley logo and location.



Headsets marked with logo, location and resistance are a little more scarce.

Seldom-seen Canadian box was plainer than American version, had orange-white-and-black label.

Later Crosley headset box had colored graphics (not reproduced here as such) and a $3.00 price tag.



Headsets for the Canadian market were branded "Musicone Balanced Headset."

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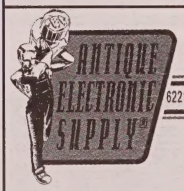

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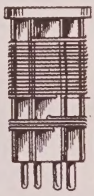
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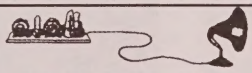
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0.0015	152K630V	0.033	333K630V
0.0018	182K630V	0.039	393K630V
0.002	202K630V	0.04	403K630V
0.0022	222K630V	0.047	473K630V
0.0025	252K630V	0.05	503K630V
0.0027	272K630V	0.056	563K630V
0.003	302K630V	0.06	603K630V
0.0033	332K630V	0.068	683K630V
0.0039	392K630V	0.07	703K630V
0.004	402K630V	0.082	823K630V
0.0047	472K630V	0.1	104K630V
0.005	502K630V	0.12	124K630V
0.0056	562K630V	0.15	154K630V
0.006	602K630V	0.18	184K630V
0.0068	682K630V	0.2	204K630V
0.007	702K630V	0.22	224K630V
0.008	802K630V	0.25	254K630V
0.0082	822K630V	0.27	274K630V
0.01	103K630V	0.33	334K630V
0.012	123K630V	0.39	394K630V
0.015	153K630V	0.47	474K630V
0.018	183K630V	0.5	504K630V
0.02	203K630V	1.0	105K630V
0.022	223K630V		

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Old-time ads are free to members collecting and restoring equipment for personal use. Please observe the following: (1) one ad per issue per member; (2) include as SASE if acknowledgement is desired; (3) material must be more than 25 years old and related to electronic communications; (4) give your full name, address and zip code; (5) repeats require another notice (we are not organized to repeat automatically); (6) the AWA is not responsible for any transaction; (7) we retain the right to reduce an ad's size if over seven lines; (8) AWA does not accept commercial advertising in this column; and (9) closing date is six weeks prior to first day of month of issue. Ads received after that time will be held for the following issue. Mail all ads to: **RICHARD RANSLEY, P.O. BOX 41, SODUS, NY 14551.**

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Atwater Kent Kiel table Model 55. Top refinished nicely, plays well, $200 if picked up locally. Terry Adelwerth, 145 Brookfield Ave., Center Moriches, NY 11934

The following radios are in excellent condition electrically and mechanically: A-K Radiodyne with five (5) brass base tubes, $1500.; A-K Model 33 (3 sets), $50. each; A-K Model 32, $50.; A-K big box Model 20, $60.; Aeriola Jr. crystal set, $200.; Aeriola Sr. one tube, $150.; Aeriola Sr. with Bakelite panel, $150.; Aeriola Sr. two tube amplifier, $200. All plus shipping. Paul Thompson, 340 Old Mill Rd. #247, Santa Barbara, CA 93110 E-mail: atkent9@cox.net

RCA 5T tombstone, 1936, $85.; RCA R-7A tombstone, 1931, $75.; Philco 20 cathedral, 1930, needs grille cloth, $145.; RCA white Bakelite Model 1X2, $40.; Emerson CE-259 portable, 1939, $40.; Zenith 3000-1, excellent!, $185. Dave Crocker, 35 Santuit Pond Rd., #4B, Mashpee, MA 02649 (508) 477-1578 E-mail: radio-1@comcast.net

SELL/TRADE—COMMUNICATIONS GEAR

National NC173, 1948 receiver, working, $130.; Hallicrafters SX42, 1950 receiver, working, $140.; Hallicrafters Sky Buddy, 1936 receiver, working, $140. Pickup only. John Be Lille, 5438 East Albany St., Mesa, AZ 85205 (480) 510-0625

Icom Model IC-211, in original box, has single-sideband, preamp, $170.; National NSB-3A, excellent condition, $315.; Zenith Royal 3000-1, excellent, $195., Zenith Royal 300-1 in nice condition, $170.; Hallicrafters SX-130, very nice, working, $225. Dave Crocker, 35 Santuit Pond Rd. #4B, Mashpee, MA 02649 (508) 477-1578

2M HTT Yaesu FT-207R, with accessories, no battery pack, works OK, $35. plus s/h. Len Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150 E-mail: radiolen@att.net

Western Electric BC-452, from WWII Lockheed Lightning aircraft, converted to AC power, $50. Dave Crocker, 35 Santuit Pond Rd., #4B, Mashpee, MA 02649 (508) 477-1578 E-mail: radio-1@comcast.net

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Headphones: Penberthy, (early), $35.; Bunnell, (scarce), $30.; RCA (scarce), $35.; S.A. Potter, T&M Works, NY., $20.; W.E. 650 (very early), $30.; Pennsylvania Type B, $15.; Century Type CZ-159, $20.; Erpees, with box cover art, $20.; Songbird, (scarce), $15.; D.L.R. (military), $15.; D-H, EC, SC No. 2, (Penn.), $15.; Connecticut, (scarce), $20.; National Radio Inst. (new in box), $20. Many other makes including Baldwin, Murdock, Superior, Western Electric, Kellogg, Federal, Utah, Brandes, others. Contact Dave Crocker for details at 35 Santuit Pond Rd., #4B, Mashpee, PA 02649 (508) 477-1578 E-mail: radio-1@comcast.net

1900 watch case earphone by Solid, $8.; 1920s RCA headphone set $12.; 1920s telephone operator's horn shape phone by Western Electric Model 396A, $35.; RCA receiving condenser UC1918, $25.; cookie jar in shape of AK 84 radio, cobalt blue, 10" high, $30. Please allow for postage. Herman Fothe, 5292 Tiffany Anne Circle, West Palm Beach, FL 33417 (561) 688-2794

Ham radio, audio, instruments (test) handyman tools and parts for experimenters, technicians, en-

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RCA Radiola 60 cabinet; Stromberg Carlson Model 225 chassis, Stromberg Carlson Model 228 chassis, Admiral Model 7C64 chassis, Zenith Model 9H081 chassis. John Zima, 1360 Reed Road, Churchville, NY 14428. E-mail: captains_z@yahoo.com

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Twenty-six Atwater Kent radios, two A-K service manuals, Gernsback Radio Encyclopedia, set of Rider's Manuals signed by John Rider; WWII surplus radio conversion manual, old tubes, books, test equipment, magazines, headsets, WWII Nazi cw key. Ronald Graves, 3120 N 72 Way, Hollywood, FL 33024 (954) 964-2063

Have too much stuff. Send two stamp SASE or E-mail for my list of tubes and parts, etc. Lots of old tubes and books. Wayne LeTourneau, P.O. Box 62, Wannaska, MN 56761 E-mail: letourneau@wiktel.com

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Simpson Model 312 VTVM in leather case, $30.; panel meters, various sizes, unused, $6. each. List your needs. Also have a 0-120 V Variac, $30. Robert Martin, 111 Bancroft Drive, Rochester, NY 14616 (585) 663-4182

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Old *QST*s: 1930s - first copy $8, second $7, third $6., etc.; 1940s - same as above, but $1. less for all beyond first two copies; 1950s - as above, but $1 less for all copies after first two copies; 1960s - as above, but $1 less for all copies; 1970s - as above, but less than above; 1980s and 1990s - even less than above. Ask for specific subjects, and I will send you copies of Contents pages. One dollar for every five pages so you can select. All copies are complete, except for a few of the very early ones which have damaged or missing back page. Charles Graham, 4 Fieldwood Drive, Bedford, Hills, NY 10507

Radio News and Electronic World. Approximately 800 volumes 1919 to 1980 complete with all ads, $800. plus shipping. Other books include "Radio and its Future" by Codell, $25.; "This Thing Called Broadcasting" by Lescarboura and Goldsmith, $25.; "Big Business and Radio" by Archer, $35., "History of Radio to 1926," $35. All plus shipping. Paul Thompson, 340 Old Mill Rd. #247, Santa Barbara, CA 93110. E-mail: atkent9@cox.net

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National front panel, escutcheon with drum type velvet vernier, ON and OFF switch above dial, 12 × 6 _ panel. Nice piece from the 1920s or 1930s. Unknown as to what it was. Best offer. Paul Recupero, 265 Union St. Portsmouth, RI 02871-2264 (401) 847-8589

SELL/TRADE—TEST GEAR

Triplett Model 3434 Sweep-marker Gen., $25.; Eico 324 Signal Generator., $35.; Weston Model 280 Volt/Amp. Meter, $25.; Simpson Model 370 Ohmmeter, $25.; Sprague Quick Test Capacitor tester, $15.; Lafayette Tube Tester, (no 4, 5, or 6 pin tubes), $35. All plus shipping. Robert Rossi, 10936 Melbourne St., Allen Park, MI 48101 (313) 386-8321

SELL/TRADE—TRANSISTOR/CRYSTAL SETS

Homemade crystal radios and parts; also radio tubes, testing good; also radio parts. Free list. Len Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150 E-mail: radiolen@att.net

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Sony 1R-81 very early transistor radio in original presentation box, has tags, $95. Dave Crocker, 35 Santuit Pond Rd., #4B, Mashpee, MA 02649 (508) 477-1578

WANTED—GENERAL

Philco 39-117, 39-17 or 39-175 dial glass or parts radio with good glass. Also Mohawk S-6 chassis, non-working OK. James S. Fisher, RR1 Box 861, Port Royal, PA 17082 (717) 527-2224. E-mail: yrless@tricountyi.net

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Heathkit HR-10B receiver; Eico 377 audio generator. Craig Maggio, 18803 Vanowen St., Reseda, CA 91335 (818) 996-4801

Anything by David Grimes: radios, especially Model 3XP, and advertising, ephemera, stories, literature, references; please contact: Mike Grimes, K5MLG, 3805 Appomattox Circle, Plano, TX 75023 (972) 867-6373. E-mail: grimesm@flash.net

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Want a 7 inch National TV, Model TV-7 or TV-

7M. Not working is fine. Charles Harper, 2000 Jackstown Road, Paris, KY 40361 (859) 484-9393 E-mail: charper@kyk.net

WANTED—LITERATURE

Operating instructions and tube testing data for Weston 774-4 analyzer needed. Will purchase original or good copy. Bill Ford, Box 606, Smiths Falls, Ontario K7A 4T6, Canada

AWA Reviews Vol. 1, 2, 3, 4, 5 and 12. Donald Swope, Box 41, Tremont, PA 17981

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Cardwell split-stator condenser type MR-260-BD, 260 pfd. each section. Trade or purchase. Louis Vermond, VA3AWA, Box 543, St. Marys, Ontario N4X 1B3 Canada (519) 284-2698 E-mail: Ldvermond@sprint.ca

GE chassis for console Model #A-67. Please call me toll-free, (800) 594-4359. Mike Urban, 58 Naugatuck Ave., Milford, CT 06460 E-mail: mike@urban-antiqueradio.com

National audio coupler S101 to complete an SW-3; also want Guthman U17 and U50 receivers. Henry Mohr, W3NCX, 1005 W. Wyoming, Allentown, PA 18103-3131

Cabinet for Zenith 5R236 or junker chassis with good cabinet. Marc Ellis, 1914 Colfax St., Evanston, IL 60201; 847-869-5016; mfellis@rcn.com

WANTED—TABLE RADIOS

1934 Emerson two band table radio mounted in a compressed compound cabinet (NOT plastic). John Koushouris, 517 Iroquois Ln #B, Stratford, CT 06614 E-mail: yaramata@aol.com

Telfunken portable radios from the 1960s, such as the "Bajazzo" in any condition. Contact Ron Zammit, 3841 Santa Domingo Road, Arroyo Grande, CA 9342; (805) 489-5724; E-mail: rzammit@monet.calpoly.edu

WANTED—TRANSISTOR/CRYSTAL SETS

Crystal sets wanted, specifically commercial sets, not home-made products. If photos are available, please let me know cost. Harry Sallee, 2615 NE 3rd Court, Boynton Beach, FL 33435 (561) 733-8171

Common Regency (transistor) radio in operating condition; Windsor 2 transistor w/box and instruction leaflet in operating condition. Also want any White's Radio Logs from 1942 to 1954. Alan Sherry, P.O. Box 1051, Riverdale, NY 10471

SILENT KEYS

We record the passing of the following AWA members with deep regret.

LAWRENCE A. BOYER, (3-7-03) was a member of the RCA engineering staff for 37 years and lived in Myrtle Beach, SC.

ROBERT E. LIGHTON, (10-23-03) was recognized in 2001 for his 50-year membership in the American Chemical Society. He was a resident of Media, PA.

EARL WATKIN KORF, K2IC, 99, (11-25-03) joined Trans World Airlines (TWA) in 1930 and worked in communications. At the time of his retirement in 1970 he was Supervisor of Navigators. During WWII Korf navigated U.S. Army Air Force transport aircraft on 250 missions to Europe, Africa, India and China. Later he worked for TWA, International Airlines and Seaboard World Airways flying military charters to Vietnam. A more detailed biography of Mr. Korf will appear in an upcoming issue of *The OTB*.

Note: AWA officers and members are being asked to submit all information about Silent Keys to Joyce Peckham, Box E, Breesport, NY 14816. This will help in the collection and coordination of information and appropriate recognition of both AWA members and others who have made contributions to the electronics and entertainment industries.

About Our Authors

GEORGE FREEMAN
The Ivory Stamp Club

George graduated from Heidelberg College, Tiffin, OH with a speech major and BA degree in 1954. He began his broadcasting career that year as a staff announcer at WKST-AM/TV, New Castle, PA, then moved up through the ranks: Top-40 DJ at WHOT-AM in his hometown of Youngstown, OH; back to the WKST stations as news director; news editor at WBBW-AM in Youngstown; news director at WNHC-AM, New Haven, CT; news director at WNBF-TV AM/FM, Binghamton, NY; news director at WDRC-AM/FM, Hartford, CT; news editor at WNEW-TV, New York City.

In 1961 he moved into marketing as an account executive for WHCT-TV, Hartford, CT, then went back to WDRC AM/FM to work in the same capacity. By 1967 he was general manager at WCCC AM/FM, Hartford, CT.

Freeman bought his first station, WGON-AM, Munising, MI in 1969. He put a companion FM station on the air there (WQXO), then bought KGRI AM/FM, Henderson, TX. These stations were sold when he bought into a major market, Louisville, KY, with WDGS-AM, New Albany, IN. That station, in turn, was sold when he became a regional manager for the National Association of Broadcasters. George bought his sixth and final station, WIKI-FM, Carrollton, KY in the early eighties and operated it for some 17 years before selling out in 1999.

Freeman is vice president of the Indiana Historical Radio Society, as well as board member and charter member of the Mid-South Antique Radio Collectors. He authors articles for the publications of both clubs as well as the "Mics and Men" for *The OTB*.

DAVID W. KRAEUTER
Circuits—Some Work, Some Don't (Crossword Puzzle)

David Kraeuter was born in Homestead, PA in 1941. He holds an M.L.S. degree from the University of Pittsburgh. He has edited the *Pittsburgh Oscillator* and the monograph series of the Pittsburgh Antique Radio Society. Currently, David writes the book review column for *The OTB*. Since the 1980s he has been interested in making the vast wealth of information buried in national patent publications more accessible to the public. He thinks he has made a beginning in this work with his latest book, *Radio Patent Lists and Index, 1830-1980*, published by the Edwin Mellen Press. In 620 pages, the book tabulates and indexes 6,200 U.S. and British patents issued to 100 radio and television inventors.

F.J. LOTITO, K3DZ
A Mid-1930s Style "TRF-Regen" Three-Tube Receiver

Frank has a BS in electrical engineering, but for most of his 30-plus-year working career has primarily done mechanical engineering, from a quality point of view, for a large international safety equipment company. He has held the call K3DZ for over 20 years, and also possesses an FCC General Phone license with radar endorsement.

He has been a home brew enthusiast from the start of his interest in amateur radio. His projects have run the gamut from modern solid state VHF and UHF FM synthesized transceivers to designs going back to the early 20s. Frank is most definitely a strong proponent of the "file to fit—fit to file," use whatever you have in your junk box school.

AL SMITH
Experiences in Early Broadcasting

Al Smith is a Silent Key, and no biographical information is available beyond what is included in his article.

RONALD R. THOMAS, W8QYR
The Radio Spectrum: Utilizing a Scarce Resource

Ronald Thomas is a communications specialist in Atlanta. He has written over 100 articles and two books on telecommunications. He holds an Extra Class Amateur Radio License, a Second Class Commercial Radiotelegraph License and a First Class Commercial Radiotelephone License. He served as a Communications Electronics Officer, with rank of Captain, in the U.S. Air Force at Cape Canaveral. He received a Bachelor's degree, with honors, from Youngstown University and a diploma in Advanced Communications Engineering from the Cleveland Institute of Electronics.

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AWA REVIEW VOLUME 16

The lead article on Powel Crosley, Jr. and the Crosley Radio Company is by Charles J. Singer, a long-time employee. Crosley's many business endeavors are described, with particular emphasis on radio manufacturing and broadcasting. This particularly detailed paper includes many never-before-seen photographs.

The development of the portable spark transmitter-receiver "pack sets" made, for the U.S. Navy and the Army Signal Corps, is chronicled by the team of Russ Kleinman, Karen Blisard, Jim and Felicia Kreuzer and August Link. This article also includes many early photographs that have never been presented in print.

Charles Kirsten traces the development of the well-known and widely-used Rider's Manuals for radio repair. Few realize the complex stages of development that went into the creation of these books and the influence on them of major characters and personalities in the radio service field.

An unusual article by Barbara Havranek addresses an often-overlooked aspect of radio history: the speaker grill cloth. The author, an expert in the field of industrial design, discusses both the aesthetic and technical aspects typical cloths. A full-page color plate shows thirty-four of the designs discussed in the text.

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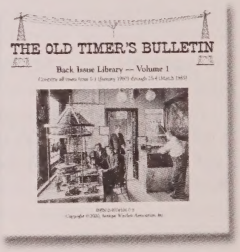

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add $5.00.

Another out-of-print classic, *The Hallicrafters Story* by Max Dehenseler, HB9RS, is also back as a CD. Max De Henseler was a personal friend of Hallicrafters founder Bill Halligan, and his book provides unusual insights into Halligan's life and early struggles. This well-illustrated book has 245 pages, a nice index and several handy lists of models and features. The CD can be displayed on any PC with Acrobat Reader version 6.0 or higher.* Thanks so much to Max De Henseler for his thoughtful gift of publishing rights to the AWA Museum. Price is $14.95, postage paid in U.S. and Canada; elsewhere, add $5.00.

*Acrobat Reader is a free program that can be had via the world-wide-web.

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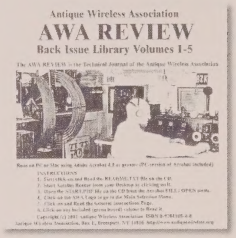

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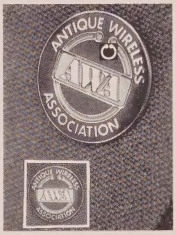

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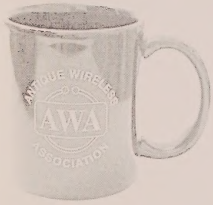

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Subtract $2.00 discount if applicable / Add $1.00 foreign postage if applicable. ***Total Index Order* $_____**

_____ **Total *AWA Review* Cost = $_____**

Add $5.00 per volume foreign postage if applicable. ***Total* Review *Order* $_____**

_____ **Individual *OTB* Back Issue CDs @ $39.95 = $_____**

Add ____**Vol 1 + Vol 2 sets @ $69.95 = $_____**

Add $5.00 foreign postage if applicable. ***Total* OTB *CD Order* $_____**

_____ ***AWA Review* CDs @ $19.95 each or $35.00 for both = $_____**

Add $3.00 foreign postage per disk if applicable. ***Total* AWA Review *CD Order* $_____**

_____ **Atwater Kent CDs $14.95 each = $_____**

Add $3.00 foreign postage per disk if applicable. ***Total Atwater Kent CD Order* $_____**

_____ **Hallicrafters CDs $14.95 each = $_____**

Add $3.00 foreign postage per disk if applicable. ***Total Atwater Kent CD Order* $_____**

_____ **AWA Membership Pin @ $6.00 = $_____**

Add $1.00 foreign postage if applicable. ***Total Membership Pin Order* $_____**

_____ **AWA Coffee Mug @ $9.75 = $_____**

Add $1.00 foreign postage if applicable. ***Total Coffee Mug Order* $_____**

Grand total of individual total amounts = $_____

Please make your check payable to AWA Museum and send to: Edward M. Gable, 187 Lighthouse Rd., Hilton, NY 14468.

Name _____ Address _____

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